

# CANADIAN PUBLIC HEALTH JOURNAL

DEVOTED TO PREVENTIVE MEDICINE

Volume 27

March, 1936

Number 3

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*Twenty-Fifth Annual Meeting, Vancouver, Week of June 22nd*

PUBLISHED MONTHLY BY THE  
Canadian Public Health Association

105 BOND STREET, TORONTO, ONTARIO



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CANADIAN PUBLIC HEALTH ASSOCIATION







# CANADIAN PUBLIC HEALTH JOURNAL

VOL. 27, NO. 3



MARCH, 1936

## Some Features of the Epidemiology of Meningococcus Meningitis<sup>†</sup>

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IN the past five years, during which time meningococcus meningitis has been endemic throughout the United States, a study of this organism in its various phases has been made in our laboratory. It is proposed to deal in this paper with one of these phases, namely, that which concerns the distribution of the organism and its initial reaction within the body of the human host at the point of primary infection. The subject will be considered, first, with regard to the organism and, second, with regard to the host.

The type designation which has been adopted is that originated by Gordon (1) with modifications to meet certain recent and possibly purely local findings in the typing of the meningococcus (table I). In the first place, the several types are arranged under two main groups. In the first group are two types, namely, I-III and V, and in the second, five types, II, atypical II\*, VI, VII, and VIII. Types I-III and V are related to each other, although

they are distinct entities when first isolated. Thus Type V does not agglutinate in Type I-III sera when first isolated but does absorb I-III agglutinins, and an antiserum prepared with Type V strains agglutinates typical I-III strains slightly. With prolonged subculture on artificial media the Type V strain shows increasing agglutinability in Type I-III antisera (2). The atypical strains in Group II bear a similar relationship to Type II that Type V does to Type I-III.

Further, neither Type III by itself nor Type IV appears. It has been our experience that, at least at the present time, it is impossible to obtain any clear differentiation between the strains designated Type I and those designated Type III. They may show slight and varying differences in their agglutinability with a given Type I or "Type III" serum, but cross-absorption is complete, and moreover we have had the opportunity to show that the type-specific polysaccharides from strains at the

<sup>†</sup>Presented at the Fourth Annual Christmas Meeting of the Laboratory Section, Canadian Public Health Association, Toronto, December 31, 1935.

moment designated Type I and Type III are apparently identical (3). For these reasons all these strains have been placed under one heading and called Type I-III. They appear to represent Gordon's Type I. One cannot be certain whether Type III, as described by Gordon, occurs today on this continent, although there is some evidence that Type V may correspond to the old Type III.

meningococcus meningitis, the Type I carrier rate may rise to very high figures, but Type I carriers are rare in the general population during endemic times (table I). An analogy may be drawn here with pneumococcus Types I and II which are the types principally concerned in the production of typical lobar pneumonia in adults but which, except again in the case of contacts, are

TABLE I  
DISTRIBUTION OF STRAINS, 1931-1935

Group	Type	Case strains		Carrier strains		Total	
		Number	Per cent	Number	Per cent	Number	Per cent
Group I	I-III	100	69	76†(4)	57.6	176	63.5
	v	...	..	4	3.0	4	1.4
Group II	II	31	21.4	30	22.7	61	22.0
	ii*	9	6.2	5	3.8	14	5.1
	vi	..	..	1	0.8	1	0.4
	vii	5	3.4	13	9.8	18	6.5
	viii	..	..	3	2.3	3	1.1

†Seventy-two of these carriers occurred in a forestry camp in which a small epidemic was in progress.

Type IV does not appear on the table. It is impossible to be certain whether strains similar to Gordon's Type IV exist in this part of the world at the moment, since neither satisfactory Type IV antigens nor sera are available with which this point may be tested. Gordon found his Type IV to be related to Type II and it may be that Type IV is represented by one of the types placed in Group II, such as atypical II\* or VII, both of which can produce meningitis in man on occasion.

What, now, is the importance from an epidemiological point of view of these various types of meningococcus? Type I is certainly the parasitic strain and is the strain which probably will be responsible for most, if not all, of the large epidemics and most of the small ones which we see. Type I strains, however, do not occur at all frequently in the throats of normal individuals. In the case of individuals in close contact with an epidemic of

rarely found in the throats of normal individuals. Type II meningococcus occupies an intermediate position. It is normally a saprophyte and is frequent in the throats of normal individuals, who have had no case contact, during endemic periods, but it can also act as a parasite and produce sporadic cases of the disease and even limited outbreaks. It also appears that the atypical II\* should be classed with Type II according to its behaviour in this respect and an analogy may be drawn between these two meningococcus types and Type III pneumococcus. The other types are all saprophytes. They appear in the throats of normal individuals, where they seem to cause no harm, and only occasionally do they produce meningitis. The experience of our laboratory with case strains during an endemic period has been that approximately 70 per cent were Type I, 20 per cent Type II, and 10 per cent atypical strains (II\* and VII).

When we enter an epidemic period, such as now seems to be upon us, the percentage of Type I cases will rise, and this has been our experience during the past year.

#### CARRIERS—CHRONIC, INTERMITTENT, AND TRANSIENT

The relationship of these different parasitic and saprophytic strains of meningococcus to their human host, that is, the carrier state, is of particular interest. It has been known in the past that in a few cases the carrier state may persist for a period of months, but it has been believed that in the large majority of carriers the condition clears up in the course of four or five weeks. This conclusion has been based principally on the belief that if a carrier shows three consecutive negative swabs at weekly intervals, he may be regarded as cured. Certain information has been obtained, however, which would cause one to question this belief (2). It has been possible to show that during the endemic times three groups of carriers may be found among the normal population, namely, the chronic carrier, the intermittent, and the transient. Of these the first continues to carry the same organism, often in large numbers, over a period of many months. Cultures are not always positive when taken at weekly intervals, and indeed negative periods may be found lasting up to four and a half months, at the end of which time the same strain, or at least one which is indistinguishable by all available methods, reappears in the nasopharynx. The intermittent group consists of individuals who are apparently especially liable to acquire meningococci which, however, do not persist. These individuals may carry a particular strain for a few weeks and it is then lost; after several weeks or months meningococci again appear in the nasopharynx but they are now of a different type from that formerly carried. This may be repeated several times. The third group are the transient carriers, in

whom the organism never persists for more than a week or two. Chronic carriers accounted for 50 per cent, intermittent for 20 per cent, and transient for 30 per cent of all carriers in the group which was carefully studied and which consisted of twenty-four normal individuals, ten of whom were shown to be carriers at some time or other during the investigation.

It should be said that it has only been possible to follow carefully carriers of Type II and atypical strains (II\*, V, VI, VII, and VIII) during endemic periods. These strains, even the typical Type II, are to be regarded as saprophytic. It is possible that the experience with the parasitic Type I strains will prove quite different. The fact that Type I carriers are unusual in the normal population might well be accounted for by the fact that such parasitic strains are unable to persist for long in the normal nasopharynx, as indeed has been stated to be the fact. One should, however, again stress the point that it seems to be unwise to base the estimation of length of the carrier state on three consecutive weekly swabs which prove negative. Reasons have been given above for doubting the accuracy of such a criterion, since negative weekly swabs occur over a period of months and at the end of that time meningococci appear in the nasopharynx again. Carriers should, therefore, be followed over a period of months in order to convince oneself that the condition has permanently cleared up. It is difficult to find an outbreak of the disease, with a high incidence of Type I carriers, so situated that these carriers of parasitic strains may be followed over a long period. We ourselves have been looking for such an opportunity for two or three years without success. In the only case in which these conditions were approached it was found that one-third of the Type I carriers persisted over five weeks and that the others were potentially affected when last

seen. The total length of the investigation was only two and a half months (4).

The strains that one meets with in the throats of both normal individuals and contacts have all the morphological and cultural characteristics of the meningococcus as usually described. From this it will be understood that for the present discussion there are not included under the heading of meningococcus such pigmented organisms as those recently implicated by Branham in an outbreak of meningitis and named by her *N. flavescens* (5). It is possible that there exist in the normal nasopharynx other strains of meningococci which pass unrecognized by reason of their unusual morphology. There may be, for example, rough strains whose appearance would in all probability be like that of *N. catarrhalis siccus* (6); but such strains have never yet been recognized and isolated, and it would be an immense labour to prosecute a search for them.

#### *Virulence of Carrier strains*

Formerly very little had been known as to the virulence of these carrier strains and the relationship

which they bear in this respect to the strains isolated from cases of meningitis. Recently Miller has described a technique whereby small numbers of meningococci suspended in a solution of gastric mucin may be made to infect mice (7). The virulence of meningococcus strains is now measurable in terms of tens or hundreds of organisms, whereas formerly, with the use of saline or broth suspensions, millions were required.

Using this technique, it has been possible to ascertain the mouse virulence of carrier strains and to compare it with the virulence found in case strains (table II). In the table the dose of meningococci is given both in terms of dilution and in actual numbers of organisms and a somewhat arbitrary distinction has been made between what we consider relatively virulent strains in which 20,000 or fewer organisms are required to kill a mouse, and relatively avirulent strains in which 200,000 or more organisms are required as a m. l. d. It will then be seen that all case strains, whether of Type I, II, or of the atypical strains, fall into the virulent group. On the other hand, only the Type I carrier

TABLE II  
VIRULENCE OF CASE AND CARRIER STRAINS

Type→		I		II		II*		VII		<i>N. catarrhalis</i>	
Number	Dilution	Spinal fluid	Throat	Spinal fluid	Throat	Spinal fluid	Throat	Spinal fluid	Throat	Spinal fluid	Throat
20	10 <sup>-3</sup> +	4		2		1					
	10 <sup>-4</sup>	1									
200	10 <sup>-7</sup> +	9				1					
	10 <sup>-7</sup>	1				1		1			
2,000	10 <sup>-6</sup> +		4								
20,000	10 <sup>-6</sup>	1									
	10 <sup>-5</sup> +		4		1						
	10 <sup>-5</sup>	1	3	3							
200,000	10 <sup>-4</sup>				8						
2,000,000	10 <sup>-3</sup> +		2		1						
	10 <sup>-3</sup>	1			1				1		
20,000,000	10 <sup>-2</sup> +				1				1		1
	10 <sup>-2</sup>								2		
No virulence	.....		1						2		4

strains can be regarded as virulent, Type II carrier strains are of definitely lower virulence, and the atypical strains, like the *N. catarrhalis*, are practically avirulent. These findings, of course, are in accord with what was said earlier as to the parasitic nature of Type I, the saprophytic nature of the atypical strains and the intermediate position occupied by Type II. It is also of interest to note the relative virulence of case and carrier strains within one type. The case strains are always of higher virulence than those from carriers and this is particularly striking with the atypical strains. The exact significance of this point remains to be studied.

#### RELATIONSHIP BETWEEN HOST AND ORGANISM

Turning now to a study of the human host, most attention has been paid to the nature of the relationship of host and organism. Is the carrier state to be regarded as a true infection or not? Is the meningococcus causing any disturbance in the nasopharynx or is it there purely in the same rôle as that played by the saprophytic *Staphylococcus albus* which is constantly present on the skin? It has been pointed out that many of the strains found in the nasopharynx during endemic times persist over long periods. These strains have been termed saprophytic and it may be that they do act merely as saprophytes in the nasopharynx. On the other hand, Type I strains are rarely present in non-contact carriers and no clear evidence exists at the moment that these strains are carried for many months or even years. They have been termed parasitic and as such may have a different relationship to the human mucosa from that of the saprophytic strains.

Two methods have been adopted in the closer investigation of this question. In one, a study was made as to the relationship between the numbers of meningococci present in

a nasopharyngeal swab as determined on the plate, and any infection of the upper respiratory tract. Webster and Hughes (8) found a direct relationship here in the case of pneumococcus carriers and considered that carriers of this organism are infected individuals. They showed that the numbers of pneumococci present tended to increase either just before, during, or after an infection of the upper respiratory tract. It has not been possible to uncover any such relationship in the case of the meningococcus. In fact, the only relationship that has been discovered is that the meningococci tend to disappear either temporarily or even permanently following the appearance of a new pathogen such as streptococcus, pneumococcus, or *H. influenzae* in the nasopharynx. This would seem to be in accord with the work of Gordon (9) and Colebrook (10) who showed that certain organisms and their products, more particularly the pneumococcus, are definitely antagonistic to the meningococcus and markedly inhibit its growth *in vitro*.

The second method adopted in the closer study of the exact relationship existing between meningococcus and host in the case of carriers has been an investigation of the blood serum of carriers for the presence of agglutinins and protective antibodies. If these are to be found in the sera of individuals harbouring the meningococcus, one must regard the condition in some degree at least as an infection. In order that antibodies may be formed there must exist a close inter-relationship between organism and host with organisms or their products penetrating the mucosal surface from time to time to enter the tissues. An opportunity was presented to make such a study during the course of an epidemic in a forestry camp (4). Both Type I and Type II carriers were studied and it was found that a certain proportion of carriers of either type gave evidence of antibodies in their

sera active for the type of meningococcus carried in the throat. These antibodies were both agglutinins and protective antibodies and the two were not found to coincide always in their presence or absence from a given serum (table III). The table shows that 32.3 per cent of sera from Type I carriers showed some agglutinins and 66.7 per cent showed protective antibodies. In the case of Type II, 60 per cent showed agglutinins and 40 per cent protective antibodies. It must be pointed out, however, that in this case one was dealing with carriers who were case-contacts and that the strains carried

human host during the initial stages of infection becomes of the greatest importance. The foregoing brief discussion of some aspects of this knowledge reveals many "blind spots" in which comprehension is still very vague. Thus: (1) While some evidence has been obtained on the differentiation of parasitic and saprophytic strains, it is as yet much too scanty to form a sound basis of any definite generalization. (2) It would appear from recent work that certain accepted facts regarding the duration of the carrier state are open to question and that this question will have to be investigated anew. (3)

TABLE III  
ANTIBODIES IN TYPE I AND TYPE II CARRIER SERA

	Type I carrier serum		Type II carrier serum	
	Agglutination	Protection	Agglutination	Protection
Good.....	4 (12.9%)	3 (25%)	2 (20%)	2 (40%)
Moderate.....	6 (19.4%)	5 (41.7%)	4 (40%)	
None.....	21 (67.7%)	4 (33.3%)	4 (40%)	3 (60%)

may be regarded as of parasitic or potentially parasitic nature. Such strains may give rise to a nasopharyngeal condition which resembles somewhat an infection even if they do not set up a frank nasopharyngitis, as indeed some observers have described. We ourselves could not see any evidence of such a meningococcus nasopharyngitis in this outbreak but even if there is no frank infection, the relationship of such parasitic strains to the tissues of the host may be closer than in the case of the saprophytic strains of non-contact carriers. We have yet to determine whether carriers of such saprophytic strains have homologous antibodies in their sera.

#### SUMMARY

Owing to the fact that the meningococcus meningitis rate is again mounting throughout the United States, and that local epidemics are appearing in increasing numbers, an examination of our knowledge of the epidemiology of this disease and of the relationship of the organism to the

Thanks to the introduction of a new technique, it has been possible to carry out some investigation of the hitherto unknown comparative virulence of case and carrier strains. The results obtained are scanty but are sufficiently suggestive to warrant further work along these lines. (4) The precise relationship of organism and host during the carrier state is still unknown, though there is evidence that in certain cases it must be intimate and that it may be in the nature of an infection.

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# The First Production of Diphtheria Antitoxin in the United States

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THE news from Germany and France of the discovery and production of diphtheria antitoxin reached me during the early months of 1894 and I began experimental work on the production of diphtheria toxin and the immunization of small animals. The next step was in the fall of 1894 when Dr. Herman M. Biggs, the pathologist of the Department of Health, went to Europe to hear the papers of Behring and Roux on the administration of diphtheria antitoxin in children suffering from diphtheria. This was the first public announcement. After hearing the addresses he was so convinced that in diphtheria antitoxin a remedy for and a probable preventive against diphtheria had been obtained that he cabled me to begin at once the preparation of diphtheria antitoxin in New York City. This was not an easy thing to do because no funds had been provided for such purposes. The New York Herald, however, was appealed to by a committee of leading physicians and it started a diphtheria antitoxin fund. Within a few days \$7,000 was obtained and I was able to buy sixty horses.

When I began to make diphtheria toxin in quantity for use in immunizing the horses, I was using the method of Roux in which a current of air was kept constantly flowing over the broth in the flasks in which the diphtheria bacilli were growing. According to Roux the cultures developed a strong toxin in about four weeks. One day our large chicken incubator in which we were developing the toxin became disarranged and the temperature rose

so high that all the cultures were killed. Although only seven days had elapsed I thought that I would test the toxin broth to find out how much, if any, toxin had developed. To my surprise I found that the toxin was fully as strong as I had expected it to be at the end of a month. Finding that in suitable broth inoculated with a strong toxin-producing bacillus it was necessary to incubate for only a fraction of the time Roux had believed necessary, I went even further and planted the next broth for the production of toxin in Erlenmeyer flasks and simply stoppered the flasks with loose cotton. The flow of air over the culture was entirely eliminated. At the end of seven days the toxin was withdrawn and found to be of good strength. This quicker method was soon followed by others making diphtheria toxin. One reason why we were so successful in our toxin production was that my new colleague, Dr. Anna Williams, in comparing different bacilli from the throat cultures sent to us from diphtheria cases with the hope of obtaining a suitable one for toxin production, discovered that a strain which we called no. 8 grew readily on the surface of the broth and made a very strong toxin. This strain is now used in many laboratories throughout the world. The antitoxin which we prepared was first used on January 1, 1895.

## THE FIRST USE OF DIPHTHERIA ANTITOXIN IN THE UNITED STATES

A few weeks after the Congress on Hygiene at which Behring and Roux had given their addresses, Biggs re-

*Note: In response to a request from the Editorial Board, Dr. Park prepared this short account of the first production of diphtheria antitoxin in the United States. The subject is of great historical interest and the Board is indebted to Dr. Park for this record, which has not appeared previously in print.*

turned to New York City with quite an amount of diphtheria antitoxin. At that time a serious outbreak of diphtheria had occurred in the Mount Vernon branch of the New York City Infant Asylum. A number of cases of diphtheria developed daily. Before Biggs brought the antitoxin we tried by making frequent cultures from the throats of children to free the institution of diphtheria carriers and so stop the development of further cases, but without avail. When I saw Dr. Biggs on his leaving the vessel, I asked him if he would give me half his antitoxin so that I could attempt to immunize the children in the Mount Vernon institution. He approved of the plan and the next day I gave 300 units of antitoxin to each of the children. Not a single case developed during the next ten days. Then a single light case developed. This child was given a curative dose of antitoxin and the children adjacent to it were injected with 500 units. There were no further cases. This established in our minds that in diphtheria antitoxin we had a certain preventive of diphtheria. We also learned that this was not a permanent immunizing agent but that its effect lasted only for two to four weeks. We found that this short duration of immunity was due to the rapid excretion or destruction in the human body of the antitoxin which, being obtained from the horse, was an alien protein.

On January 1, 1895, when we had our own antitoxin, we began to use it regularly in the diphtheria cases at the Willard Parker Hospital. There was a strong difference of opinion as to the value of the diphtheria antitoxin, as one of the leading attendants at the hospital had been deceived in the value of tuberculin as a curative agent in tuberculosis and did not wish to be deceived again. I therefore suggested giving the antitoxin to alternate cases. After six weeks the whole staff, with the exception of the attending physician who originally opposed its use, were convinced that when given to

cases of diphtheria early in the disease it was effective in preventing the further development, but that when given to late cases it seemed to have little or no effect. With the evidence which we had during these six weeks of trial, we were able to convince the people of New York that in diphtheria antitoxin we had not only a preventive but a cure, in the sense that in preventing the further development of the poisoning we brought about recovery. Diphtheria antitoxin was rapidly accepted by the medical profession of New York City and throughout the country and several biological houses soon began to prepare it.

There was one decided objection to the use of diphtheria antitoxin, namely, that persons receiving it frequently developed serum sickness. A lesser objection was that because of the relatively small amount of antitoxin in the serum a large dose of the serum had to be given. I therefore asked the chemist in our laboratory to attack the problem of separating as far as possible the antitoxin from the inert substances in the serum. The first to attempt this was Mr. J. P. Atkinson. Further important advances were made by Doctors R. B. Gibson and E. J. Banzhaf. These investigations resulted in a practical method of refining diphtheria antitoxin, which lessened greatly the number and severity of the attacks of serum sickness following the injection of this antitoxic serum in human beings.

The refining of antitoxin was rapidly taken up in this country but more slowly abroad. During the forty years during which diphtheria antitoxin has been used the morbidity and mortality from diphtheria has greatly declined. It was found, however, that quite a number of cases still developed. For this reason, at first toxin-antitoxin mixture and, later, diphtheria toxoid have been largely used and produce a lasting active immunity rather than the short passive immunity produced by antitoxin.

# An Epidemic of Bacillary Dysentery in Matane, Quebec\*

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**D**URING the months of February, March, and April, 1935, a severe epidemic of dysentery occurred in Matane. This village, with an estimated population of 5,134, is located on the south shore of the St. Lawrence river, 250 miles east of Quebec.

It is believed that over one-third of the population was attacked during the outbreak, probably some two thousand cases occurring. It has been established by our laboratories that the etiological agent which caused the disease was *Bacillus dysenteriae*, type Flexner. The outbreak seemed to appear in two waves, the first one at the beginning of February, with a certain number of sporadic cases and without mortality; the second, in the second week of March, much more severe in character, with a greater number of cases and a number of deaths. This second outbreak was stopped only when adequate measures of sanitation were applied, in the middle of April.

The Medical Officer of our Health Unit for this district was informed of the occurrence of cases by one of his public health nurses and by one of the local doctors. The situation was not alarming and our officer did not believe, at that time, that the epidemic would claim many victims. The outbreak was reported to the Division of Epidemiology on March 4th. Immediately afterwards, through sickness and a death in his family, our officer was absent from Matane for over a week. When he returned, the second wave of the epidemic was in progress and the whole population was alarmed over the extent of the outbreak.

A hurried investigation established that the only common vehicle of infection was water. The appropriate measures of prevention were outlined to the population and control was instituted by the County Health Unit.

## SYMPTOMATOLOGY

Among infants the disease appeared as a severe diarrhoea, with vomiting, colic, convulsions, and liquid stools, green at first and then bloody with pus, with a frequency in number from ten to one hundred a day. In severe cases dehydration soon appeared and in fatal cases death was due to inanition. The prognosis was very unfavourable. The incubation period varied from 24 to 48 hours.

There were only two deaths among adults: one person aged 64 years and the other 75 years of age. In adults the incubation period was somewhat longer, being from two to five days. The dysentery was characterized by numerous liquid stools, greenish in colour during the first few days and later containing blood and pus, and was accompanied by very severe intestinal colic. All the patients complained of griping pains in the stomach before defecation and of tenesmus afterwards. They complained also of weakness for days after recovery. The adult patients were sick for a period of from five to twelve days. It was of common occurrence to observe from five to ten cases in one family.

## EPIDEMIOLOGICAL FINDINGS

In the middle of April the writer went to Matane to study conditions

\*Presented at the Fourth Annual Christmas Meeting of the Laboratory Section, Canadian Public Health Association, Toronto, December 30, 1935.

and to assist in control measures. From information received through the local doctors, there were at the time about 300 acute cases of dysentery. An investigation had been commenced by the Inspector of Health Units which was completed later by the Medical Officer on his return. From this investigation the complete history of 106 cases was available. These were a fair sample of the acute cases. Visits to homes throughout the district were made by the personnel of the Health Unit. With a very limited staff, it was not possible, however, to investigate every case of dysentery.

Table I shows that we were dealing with an epidemic extending over a period of fourteen weeks. We knew

sion of the causative organism, as a milk-borne epidemic would have been much more explosive.

As shown in table II, the most striking feature of the age distribution was that over 45 per cent of the cases occurred in the age-group 0 to 4, proving the selectivity of the epidemic for infants. This age-group forms only 12.3 per cent of the population. The distribution of cases is, therefore, four times the distribution of population. In the next age-group, 5 to 9 years, we have 12.3 per cent of the population and 16.0 per cent of the cases. In the older age-groups we have a decreasing morbidity. If this distribution is plotted by quinquennial age-groups, the skewness of the curve is very apparent. This may be explained by the physical strength of the persons composing the older age-groups and by a certain degree of acquired immunity.

The distribution of cases by sex is in accord with the sex distribution of the population and is of no epidemiological interest.

TABLE I

ONE HUNDRED AND SIX CASES OF DYSENTERY  
ACCORDING TO DATE OF ONSET

Period	February	March	April
1st-9th day....	0	13	11
10th-19th day...	5	35	..
20th day to end of month.....	9	33	..
	14	81	11

at the time that a certain number of cases had occurred in the first ten days of February and that an unknown number of contact cases could be expected in the weeks following the subsidence of the epidemic. The character of the incidence is a fair indication that milk, or some other food, was not the mode of transmis-

#### MORTALITY

This outbreak caused directly 39 deaths, which shows the severity of the epidemic and the toxicity of the causative organism. Table III shows again the selectivity of the epidemic for the young age-groups. The younger the babies, the less resistant they were to the infection and the more suscep-

TABLE II

DISTRIBUTION OF CASES BY AGE-GROUPS IN CORRELATION WITH THE PERCENTAGE  
OF POPULATION BY AGE-GROUPS

Age-Group	No. of Cases	Per cent of Total Cases	Proportion of Population by Age-Groups (1931 Census)
0-1	8	7.5	} 12.28
1-2	11	10.4	
2-4	29	27.4	
5-9	17	16.0	12.31
10-19	27	25.5	21.42
20-39	7	6.6	29.99
40+	7	6.6	24.0
Total	106	100.0	100.0

tible of dying. Only two deaths occurred from the beginning of the epidemic in February to the 21st day

TABLE III

TOTAL DEATHS BY AGE-GROUPS AND MONTH OF OCCURRENCE

Age at Death	Deaths			Total
	February	March	April	
0-1	0	7	19	26
1-2	0	0	5	5
2-4	1	2	3	6
5+	0	0	2	2
Total.	1	9	29	39

of March; but from this date to the 25th of April it was not infrequent to have a number of deaths recorded in a single day. For instance, there were three deaths on March 28th and on April 6th, 9th, 14th and 17th; two deaths a day on March 25th and 26th and on April 4th, 13th, and 23rd; and one death on each of the following dates: March 22nd and April 3rd, 7th, 8th, 12th, 15th, 16th, 20th, 21st, 22nd, 24th, and 25th. Taking into account the fact that these took place in the country, where even one death is the subject of much comment, I need not stress the alarm and anxiety of the population. They were anxious to learn what was the cause of the epidemic and how it could be stopped.

#### LABORATORY WORK

The first sample of faeces was sent to the Provincial Laboratory on March 4th and a report was received that *B. alkalescens* had been isolated. As this result did not agree with the clinical symptomatology of the case, new specimens were sent on March 18th, and on March 22nd the report was received stating that *B. dysenteriae* Flexner had been isolated from these specimens. Forty-two specimens of faeces were submitted and a positive report for *B. dysenteriae* Flexner was received in seven different cases. Specimens of water and milk

were also sent to the Provincial Laboratory but the specific organism was not isolated. The length of time elapsing between the submitting of specimens and the date of the report was occasioned by the distance of Matane from Montreal, namely, 430 miles, and train facilities are somewhat limited. There is no doubt, in my opinion, that more rapid transportation would have enabled the laboratory to isolate the organism in a larger proportion of the specimens submitted.

The agglutination reaction was not carried out on account of the reluctance of the babies' parents to let us take the required amount of blood.

#### TRANSMISSION OF THE CAUSATIVE AGENT

What common food or beverage served as the vehicle of *B. dysenteriae*? One case, or a germ carrier, of dysentery could not infect a community by direct contact. The investigation proved that no common food, such as butter, bread, meat, and sausages could be incriminated. There remained only, as vehicles common to the population as a whole, milk and water.

#### Milk

Out of 106 patients investigated, 12 did not drink any milk. Of the 94 using milk, 73 drank raw milk, 18 boiled milk, and 3 used condensed or evaporated milk. In other words, 73 patients could have been infected through milk, but milk was not the probable source of infection in the 33 other patients. There is, however, one instance where a milk dealer might have caused cases among his customers. The wife of this dealer who herself did the milking, contracted dysentery and for about a week afterwards there was an unusual number of cases on this milk route. Did this woman really contaminate the milk? We are willing to answer in the affirmative. But this contamination was of short duration and

would not explain the whole epidemic.

The 94 patients who drank milk were the customers of eight different milk dealers. In table IV are given the initials of the dealer, the number of quarts of milk sold daily, the water supply at the dairy, and the number of patients served by each milkman.

TABLE IV  
DISTRIBUTION OF CASES ACCORDING TO MILK SUPPLY

Name	No. of Quarts Sold Daily	Water Supply at the Dairy	No. of Patients
A.L.....	58	Municipal	18
G.L.....	54	Good well	7
A.D.....	80	Good well	4
C.T.....	65	Doubtful well	19
V.G.....	65	Doubtful well	12
P.M.....	70	Good well	3
L.L.....	90	Good well	5
G.R.....	45	Good well	3
Owners of a cow.....			3
Persons buying milk surplus from neighbours owning a cow.....			16

A.L. was the milk dealer to whom we referred. We must add that quite a few families bought their supply of milk from more than one dealer. It is necessary to point out also that the three dealers who had the largest number of cases amongst their customers were supplied with municipal water or had a well of doubtful quality. That milk was not the primary vehicle in the transmission is supported by the fact that 16 cases occurred among families receiving their daily milk from a neighbour owning a cow. It is, however, probable, not to say evident, that in some instances milk was the vector of infection.

It was conclusively shown, all through the outbreak, that contact from person to person was an important factor in the propagation of the disease. Infants of one day of age and breast-fed babies of sick mothers were attacked by the disease and died within 48 hours. Examples also of the spread by contact were found among older children who, although not exposed by drinking water, came down with dysentery and barely escaped dying.

### Water

Of our 106 patients, 10 usually drank water from their own wells, although many of them admitted having drunk water from the municipal system. The other 96 persons used municipal water. The distribution of cases was general throughout the area served by the municipal water system. There were only sporadic cases outside the village limits, and these were among persons who had drunk water in the village. After having proved the presence of at least one carrier on the watershed of the reservoir, we can fairly conclude that this epidemic was water-borne.

In December, 1934, the water was bacteriologically examined and *B. coli* were not found in quantities of 1 cc. and 10 cc. of water. In April, 1935, two specimens of water were submitted to the laboratory. In one sample *B. coli* were reported to be present in 4 of 10 tests in 1 cc. quantity and in 2 of 2 tests in 10 cc. quantities. In the second sample *B. coli* were present in 1 of 10 tests in 1 cc. and in 1 of 2 tests in 10 cc. of water.

As the water level of the lake supplying the system had fallen considerably since the autumn of 1934, threatening, in fact, the supply, the municipal authorities decided in the latter part of January to lower and extend the water intake into the lake for a distance of 315 feet. From January 29 to February 3, 1935, 12 men worked on and around the lake, and from February 17th to 27th the same group of men were employed on this work. After many interruptions, due to lack of material, the work was completed on April 18, 1935. The labourers lived at a camp located 250 feet below the dam. No privies were provided, with the consequence that faeces and urine polluted the ground adjacent to the camp and dysentery bacilli were transported on the boots of the workers to the water intake. During the course of the work 20 men were employed by the municipality.

Towards the end of the outbreak



specimens of faeces were collected from each and two positive reports of *B. dysenteriae* Flexner were received from the laboratory. The first was not significant as this man was just convalescing from dysentery. The second positive report, on the other hand, was important. The specimen was submitted by one of the labourers, W. G. Investigation established that W. G. had mentioned to the other men that he suffered from an occasional diarrhoea and that now and then he would pass blood in his stools. From other sources we ascertained that he had been discharged from military service during the Great War on account of this condition. The time-sheets showed that W. G. had worked at the lake on the following dates: For three days commencing January 29th he had been employed in cutting ice on the lake. On February 24th and for the following six days he worked at the lake, part of his job consisting in sinking the pipe into the lake. On March 5th he had three days' work; he was sick at the time and had liquid stools with blood. The foreman happened to see these stools. On March 18th he had two

days' work and was discharged on account of sickness, which proved to be dysentery.

*Steps Taken.*—The ground around the camp, the pipe-line, and the reservoir were disinfected under the supervision of one of our sanitary engineers, bringing to an end this unusual outbreak of bacillary dysentery.

#### SUMMARY

(1) A severe epidemic of bacillary dysentery occurred at Matane, Quebec, in 1935. (2) The causative organism was *B. dysenteriae* Flexner. (3) The morbidity rate was very high, particularly among infants. (4) The epidemic occurred in two successive outbreaks. (5) The mortality was high, the case-fatality rate being very high among infants. (6) The epidemic was water-borne and evidence is submitted that a chronic germ carrier contaminated the water supply at the lake. (7) The epidemic came to an end with disinfection of the water-system. (8) Chronic carriers are a menace to the community and constitute a serious public health problem.

#### PUBLIC HEALTH A MAJOR SOCIAL OBJECTIVE

"PUBLIC health is not hygiene or preventive medicine," as the late and beloved Dr. Linsly R. Williams once said. "It is a concept of the condition of health of the community. Efforts to conserve the public health include both those which affect the health of the community as a whole, and those which seek to prevent any individual or group of

persons affecting adversely the health of others." . . . Public health is being looked upon more as a major social objective, not as merely sewage disposal, or the prevention of infectious diseases, or popular instruction in hygiene.—Edgar Sydenstricker, *The Milbank Memorial Fund Quarterly*, vol. 13, no. 4, 1935.

# Cancer Control as Seen by the Public Health Nurse

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IN a consideration of the prevention of cancer, it is well to start with the fact that the cause of cancer remains unknown. We do know that a cancer does not begin as cancer. A group of normal cells, changed by some factor to abnormal cells, behaves in an unusual way, multiplying at such a rate that they cease to serve any useful function. In their growth, these abnormal cells invade the normal tissues, destroying everything before them, and eventually the hostile army reaches the lymph glands. Here some of the cancer cells separate from the original growth and are carried through the lymphatics to other parts of the body where new masses are formed.

Preventive measures should be taken long before this stage is reached, and the public must be educated to a realization of the importance of paying attention to any abnormal condition that may arise.

If cancer does not begin as cancer, there must be predisposing causes, and we find a great many of these. Chronic irritation and injury are factors, and preexisting little lumps, like warts and moles, and unhealed wounds anywhere are sites in which cancer develops.

The late Dr. Joseph Colt Bloodgood, of the Johns Hopkins University, said:

"The symptoms, signs and warnings of little things that are not cancer and never will be cancer, and of little things that are not cancer but may become cancer, and the earliest stages of cancer, are identical. Advice should be sought immediately after the first warning."

He stated further:

1. Every lump that can be seen and felt

should be seen and felt by a doctor immediately.

2. Anyone with a new sensation in a bone or joint should seek an x-ray examination.

3. If women are examined within a week after the appearance of any symptom, their chances of having a cancerous lump are less than 10 per cent, and their chances of a permanent cure are more than 70 per cent. If the breasts of women are examined annually or semi-annually for mastitis, the probability of finding a cancerous lump is distinctly less, while the chances of accomplishing the permanent cure will be distinctly greater.

4. When people seek an x-ray examination of the stomach, as they seek soda-bicarbonate when they have indigestion, the cures of cancer of the stomach will increase greatly.

5. If there is any fear of disease, let it be in the beginning after the first warning, and let that fear urge the individual to a proper examination. Fear at the end of a disease only adds to the discomfort, and is not protective.

Once the public has been convinced that these predisposing factors are the early signs of cancer and that, if treated immediately, cancer can be cured, we have taken a great step forward. But first, we must give our public some idea of the early symptoms. This does not mean that a patient must diagnose his own case and then seek treatment. We hope that periodic health examinations, at which the early symptoms of many diseases will be discovered, may become the rule. But if in the interval between examinations the patient should notice any peculiarity, he is urged to return to his physician for examination.

Predisposing causes of cancer of the skin are fairly readily noticed, such as suppressed hair follicles in an oily skin, persistent warts, which are sometimes pigmented, and pigmented moles, or small lumps of any kind. These may have been noted pre-

vously, but through irritation—mechanical or chemical—they may have begun to change in character. A benign tumour may begin to enlarge; a wart or mole may show some very slight change in character; a suppressed hair follicle may cause trouble. Any one of these signs calls for a visit to the physician. Once the patient has reported his suspicions, it is the duty of the doctor to examine him thoroughly and, if necessary, prescribe treatment.

Cancer of the skin is relatively common among workers in some industries, namely, those in which there is constant irritation of the skin by an oil or chemical. Experimentation with rats and mice has shown that, following frequent daubing with some of the coal-tar products, cancer of the skin may develop.

Cancer of the mouth has, until recently, been confined almost exclusively to men. It was they who smoked pipes, chewed tobacco and neglected their teeth. Since women have begun smoking to a greater extent, our friends of the other sex have discarded pipes, particularly those of the clay and corn-cob variety, and have substituted cigarettes. Men are beginning, too, to realize that their teeth need a great deal of attention. Statistics, within the next few years, will probably show that there has been an increase among women of cancer of the buccal cavity, although there should be a decrease in the whole rate.

One of the first people to see a cancer of the mouth is the dentist. Small ulcers are quite frequent and, as a rule, do no harm. At times, the first lesion has been formed by irritation caused by a rough-edged tooth or an ill-fitting plate, or by such other irritants as tobacco and alcohol. The advantage of periodic dental examinations was demonstrated a few days ago. An elderly man attended a clinic for a physical examination. He was a newcomer to the city and had not seen a physician since his arrival. For many years he had worn dentures and, since he had no teeth, he

concluded that a dental examination was unnecessary. He complained of a small ulcer under the lower plate. After examination, the doctor referred him to hospital; he has since been admitted and is now being treated for a very early cancer.

If we create in our children habits of oral hygiene, if we eliminate mouth breathing and ensure good eating habits, thus forming a good dental arch with normal occlusion and chewing powers, we not only ensure for the children sound teeth that will last a lifetime, but we lay the foundation for eventual elimination of cancer of the buccal cavity.

Cancer of the stomach and intestine is more difficult to diagnose. It may be indicated by gastric disturbances, so-called "indigestion", loss of appetite and weight, slight anaemia and weakness. Anyone with any of these symptoms should seek advice immediately. Early diagnosis of cancer of the lower bowel is difficult. Symptoms to be watched are constipation alternating with comparative looseness, distension, colic and bleeding. If treatment is to be effective, it must be started as soon as the first symptoms appear.

It was Benjamin Franklin who said that we dig our graves with our teeth. That was many years ago, and fortunately for his peace of mind he did not live long enough to see how quickly the graves are being dug. We bolt our breakfast because the last few minutes in bed are very precious. If we are women, we swallow lunch in fifteen minutes because we need the rest of the hour for shopping. If we are men, we eat lunch in ten minutes because we must see a business acquaintance who has already bolted his lunch, both of us being too busy for discussion at any other time. We rush through our dinner for fear of missing our favourite radio program, or because we are in a hurry to get dressed for the evening. We end the day, and add to the already present gastric distress by smoking innumerable cigarettes and drinking quantities of a beverage designed to

make life even madder than it was before. If we could march through life at a slower tempo, learn to do things in moderation, make of living a pleasure rather than a business, we would obviate many of life's ills, and maybe, though this is just an impression, we would also prevent, to some extent, cancer of the gastro-intestinal tract.

Cancer of the breast is said to be one of the most hopeful and curable forms if treatment is applied in the earliest stages. This form, too, has its characteristic signs, usually a small lump, very often accompanied by a bloody and watery discharge, distortion of the nipple or the sinking into the breast of a previously prominent nipple, and inequality of the breasts. Pain is nearly always absent, and if treatment is delayed until pain is felt, it will have little effect. One of the most frequent causes of cancer of the breast is mastitis, caused very often by stagnation of the milk of nursing mothers. According to Dr. Schereschewsky, of the United States Public Health Service, "it is worthy of remark that certain countries, such as Japan and Italy, where sustained breast-feeding of infants is the rule, have conspicuously low mortality from cancer of the breast."

The main factor in cancer of the cervix is the presence of neglected cervical lacerations. The disease is more prevalent among women who have borne children, and it is in the ante-natal period that education must be begun. If every mother or mother-to-be could be made to realize the advantage of having proper medical and nursing care at her confinement, the task would be much easier. So many women think that once the baby is born, everything is all right. They must be taught that nearly every birth is accompanied by a tear which should be repaired; also that it is important to have an examination six weeks post-partum to detect any condition which might cause chronic irritation and an examination semi-annually thereafter to detect any breaking-down of the repaired tissue.

Any women having spotting of blood or leukorrhoea should see a physician immediately.

Although cancer of the cervix is entirely a disease of women, men should know of it as well. Many women neglect themselves simply because their husbands, not knowing the true state of affairs, criticize them for continually "running to a doctor" and charge them with neglect of their families.

The mere fact that a cancerous mass has been removed does not mean that the danger is past. A cancer that has been neglected too long before treatment is instituted may have metastasized; that is, some of the cancer cells may have entered the lymphatic or blood streams and have been carried to other parts of the body where a new cancerous growth has developed. A short time ago I saw an elderly woman who had undergone a breast amputation some five years previously. Very soon after the operation she noticed a small lump in the axilla, but thinking that her cancer had been cured, she paid no attention to it. For the past three years she had had pains in the knees and hips which she attributed to rheumatism. Hospital attendance was advised, but two weeks later she had not taken the advice and was found in bed. With the assistance of another nursing organization, she was sent to hospital, where she died, in three days' time, of generalized carcinoma.

The prevention of cancer is a problem of education, and the hopelessness of the disease is due, in large part, to the ignorance of the people. In our program of education we must depend, to a great extent, upon the press and the radio, but these means reach only a few. Many people turn the radio off when a speech comes on, and since there have been no snappy songs written about cancer, it is difficult to catch the public ear. These people, too, read only the headlines of a newspaper, and as cancer is not exciting enough to merit a place in the columns of the tabloid, it is well-

nigh impossible to catch the public eye.

It remains then for the news to be spread by word of mouth, and who are better fitted to disseminate this knowledge than are the nurse and the doctor? Private-duty and public-health nurses cover the field fairly adequately, and they have access to rich and poor alike. The former may come in contact with the patients of a specialist, a man who is too busy to spend much time with the patient himself and who leaves his orders and instructions to be carried out by the nurse. Since she is in close contact with her patient all day, her opportunities for instruction are manifold.

The public-health nurse most frequently visits the homes of the poor, the homes of those who must attend the public clinic and who depend, largely, for advice and supervision upon the visiting-nurse. The visit of the skilled nurse is not confined alone to the person needing care, nor does her interest lie solely in one specific ailment. Her visit must be one of general enquiry and advice: whether Johnnie has had the wart removed from his toe; if father's ill-fitting dental plate has been remedied; if mother, whose baby is two months old, has been given a post-partum examination. Upon the intelligence of the individual will rest the amount of time that the nurse must spend in the home, but if, through constant repetition, she can convince a family of the need for adequate ante-, intra- and post-natal care and of the necessity for attention to pre-cancerous conditions, she will have accomplished a great deal.

The person who is probably the focal point of all this education is the family practitioner. It is he who is called in by that vast number of people who cannot afford a specialist and yet who cannot go to a public clinic. He is called upon to give an expert opinion concerning any kind of ailment, and upon him rests the responsibility for early diagnosis. We cannot look to him for miraculous cures, but we should be able to depend on his recog-

nizing a pre-cancerous condition and referring the patient immediately for treatment rather than to await developments. It is on the family doctor we rely to spread the gospel of prevention in rural communities where there are no specialists and no hospital clinics. The same doctor is called in by rich and poor alike, and although very often a much busier man than any specialist, he nevertheless seems to have time for a chat, and he may do a great deal of teaching in a five-minute conversation.

Fear is a great factor in delay. The public hears only of the cases of cancer that have not been cured; nothing of those which have been treated successfully. There is an attitude as regards cancer that is similar to that which is held in connection with tuberculosis and venereal disease—those who have cancer are reluctant to talk about their disease. The public feels, therefore, that operative measures are a last resort, not realizing that sometimes they are preventive.

According to Dr. Bloodgood, the duty of the medical and the nursing professions is four-fold:

1. To establish confidence instead of fear.
2. To keep the public abreast of modern medical procedure.
3. Mothers and mothers-to-be must be instructed in precautionary measures through a periodic examination.
4. Knowledge without action being negative, the public-health nurse must persuade people to act upon the knowledge in their possession.

Preventive medicine has brought many diseases under control; we have only to look at statistics on smallpox and diphtheria to realize this. And by preventing deaths in childhood and in the early adult stage, we are saving more people who may develop cancer in old age. We had to educate the people to the point where they were willing to use smallpox vaccine and diphtheria toxoid before we got results. It is our task now with cancer to educate them to the point where they are willing to undergo periodic physical examinations and to follow the advice of the physician.

# Arsenical Poisoning Dermatitis\*

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IN the treatment of syphilis by intravenous injection of small amounts of metallic salts it is inevitable that there should occasionally be cases of poisoning due to these metals. The frequency of the particular type of poisoning that we are discussing, dermatitis caused by arsenic, is fortunately small. At the Ottawa Civic Hospital† there have been treated, in the last five years, only five cases of dermatitis traceable to arsenic—roughly one of every 10,000 General Hospital admissions. We have a definite record of only one case at the Ontario Hospital, Brockville.

## CHEMOPATHOLOGY

It has been shown by Dennie and McBride<sup>1</sup> that in cases of arsenical dermatitis the liver and skin bear the brunt of the injury. It is very probable that, following its administration, the arsenic is retained in the liver and fixed-tissue cells for a long period of time and is fed, by degrees, to the sensitive skin. Treatment depends on the ability of the therapist to neutralize this arsenic by some chemical. Kidney findings are secondary to the liver saturation, and these writers state that they have found the kidneys to be peculiarly tolerant to arsenic.

## SYMPTOMS

Warning signs and symptoms of disaster in connection with dermatitis due to arsenicals are:

- (a) Itching of the palms and soles, or generalized pruritus.
- (b) Violent reactions lasting more than six hours, leaving the patient pale, cyanotic, listless, with muscles

sore, metallic taste in the mouth, and unable to take food.

(c) Scarlatiniform, rubellaform or dermatitis venenata-like eruptions, occurring from twenty-four to seventy-two hours after administration. (If one more injection is given, the patient will invariably develop arsenical dermatitis.)

(d) Nervousness and loss of weight.

(e) Haemorrhages from upper or lower intestinal tract; also hematuria.

## PREDISPOSING FACTORS

Factors which predispose to the condition are: (a) liver injury of any kind, manifested by jaundice, no matter what its cause; (b) focal infections—teeth, tonsils, or sinuses—or asthmatic conditions; (c) acute febrile infections; (d) acute or chronic nephritis; (e) arteriosclerosis; (f) pernicious anaemia; and, of course, individual eliminative power for arsenicals, which can be determined only by liver function tests.

## TREATMENT

The treatment of arsenical poisoning by sodium thiosulphate is based on a solid chemical foundation. Sulphur will cause the precipitation (as sulphide) of arsenic, as well as of many other metals. It neutralizes the poison and makes it soluble and excretable.

The dose suggested by Dennie and McBride<sup>1</sup> in 1924 has been found satisfactory; namely, 0.3 gm. administered intravenously daily for four days, then in increasing doses, every other day, for as many days as are necessary. Their maximum dose was 1.8 gm. and they did not

\*Presented before the Ontario Neuro-Psychiatric Association, Toronto, November 29, 1935.

†The author is indebted to Dr. J. Dobbie, of the Ottawa Civic Hospital, for statistics regarding the frequency of arsenical dermatitis and the case histories.



find any cases of toxicity with this dosage.

#### CASES

We have records of six cases, of which four are reported, one in considerable detail.

*Case No. 1. C.F., Chinese, 52, male. Weight 145 lbs.* Following a full course of Salvarsan, the last injection of which had been given one week before admission, the patient had a slight rash on arms and legs. Following the last injection the rash became very itchy, covering the arms and legs completely with scattered areas over the body of a rubellaform type. The patient was given sodium thiosulphate, gr. vii ss, intravenously in seven injections four days apart. The rash cleared slowly and he left the hospital in exactly one month.

*Case No. 2. C.G., 54, male. Weight 143 lbs.* Following eight injections of Salvarsan a rash suddenly appeared on arms, legs, and hips. The areas were swollen and red and three days later began to scale. The rash was itchy from the first. The skin on arms, legs, thighs, buttocks, and across the back showed a heavy scaling on a red indurated base. The skin on the abdomen was red and indurated. This case was treated with sodium thiosulphate (47 injections) and locally with Whitfield's ointment. The dermatitis gradually cleared over a period of three and a half months.

*Case No. 3. M.D., 30, female. Weight 100 lbs.* After the fourth dose of Salvarsan, the patient's arms became itchy, also the palms and soles. A papular rash appeared on the arms and progressed through stages to an exfoliative weeping dermatitis, first on the hands and face. It then spread to the whole body and went through stages of crusting, drying, cracking, and weeping. In hospital it cleared up noticeably twice, only to go through these stages again. This patient ran a temperature when more than 0.3 gm. of sodium thiosulphate was given,

and on admission, when bismuth was given for her positive Wassermann, she developed a temperature of 103°. However, she gradually improved and the dermatitis cleared up completely in a period of four months.

*Case No. 4. E.B., 30, female. Weight 92 lbs.* This patient's Wassermann test was strongly positive. She had ten injections of Novarsan, beginning with four doses of 0.45 gm.; the last two doses were 0.9 gm. Six days later she became mildly excited, refused to eat, and showed a blue line around her gums. Arsenical treatment was discontinued.

During the next week she began to have a localized oedema of the face, the first signs being some swelling of the eyelids and the lips, accompanied by circumoral pallor. This progressed and in ten days after the last Novarsan treatment her ears were swollen, eyelids swollen shut, and ankles quite large. Urinalysis was negative. Ten days later her face, abdomen, back, hands, wrists, knee joints, and ankles were badly swollen. At this time it was found that she had gained 10 lbs. in weight. Behind the ears red spots appeared which became indurated and formed bullae, and there was exudation of a thin yellowish serous fluid which formed crusts. This condition rapidly spread to the brachial regions and over the body. There was little swelling of the scalp, but the hair was continually moist with some serous exudate and hair fell out in large quantities. This crusting continued for six weeks. There was never any temperature over 99°. During the period of exudation her immediate person was surrounded by a heavy sweetish odour.

Treatment was begun with ichthyol, but this caused a secondary dermatitis, and balsam of Peru was found to relieve the patient of the pain and burning. The patient's back began to clear first and gradually desquamation occurred and new skin appeared over shoulders, neck and face, then chest, abdomen, legs

and arms simultaneously. The scales, which could be swept up from around her bed after her morning care, were larger and thicker than those of scarlet fever, and the period of desquamation lasted three weeks. The condition cleared spontaneously during a period of approximately three months. Pictures of her, some seven months later, show no signs of the condition from which she suffered.

#### CONCLUSIONS

We cannot be too careful in our administration of arsenicals intravenously and we must not forget to regulate the dosage to correspond with the body weight of the individual. We must always be on the watch for toxic signs. Dermatitis is,

of course, only one of the manifestations of toxicity; others are jaundice and neuritis. Cases of acute yellow atrophy of the liver are, fortunately, exceedingly rare.

Any skin eruption occurring during a course of arsenical treatment should call for discontinuation of treatment and prompt administration of sodium thiosulphate. Liver function tests should be made before again beginning treatment with any metallic salt, and doses of metallic salts must be adjusted to the individual liver function.

#### REFERENCE

1. Dennie, C. C., and McBride, Wm. L.: *Treatment of Arsphenamin Dermatitis, Mercurial Poisoning, and Lead Intoxication*, J.A.M.A., 1924, 83: 2082.

### MENTAL HYGIENE OBJECTIVES

THE mental hygiene movement had its beginning in Canada seventeen years ago when far-visioned citizens and a group of scientists joined forces to study our needs and to promote progress. This pioneer work in mental hygiene was related in large measure to existing cases of mental maladjustment. It was assumed that responsibility for treatment and control could be left to specialists—to psychiatrists in particular. But we realize to-day that such a program, while valuable, is too limited. When we take such factors into account as the large numbers of people who are mentally afflicted, the cost of multiplying psychiatric services and the varied activities that may be involved in prevention, we come to the conclusion that mental hygiene must resolve itself

into a co-operative endeavour with psychiatrists and many others taking part.

The nature of our task in mental hygiene is clarified when we make use of the term *mental health*. And by *mental health* we mean robustness of personality and physique to withstand the exigencies and shocks of life without resort to mental illness; we mean rich, wholesome, vigorous, effective living.

When the task of mental hygiene is so defined, we immediately realize that there is work not only for the psychiatrist but for the general body of the medical profession, for teachers, social workers, clergy, parents and, indeed, for every one of us.—C. M. Hincks, M.D., *Mental Health*, vol. 8, no. 1, 1935.

# Accidents and the Public Health\*

## With Particular Reference to Automobile Accidents

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**A**CCIDENT is a major health hazard. Much of the toll in injury and death and much of the tremendous economic loss is preventable by reason of the fact that accidents are seldom due to chance<sup>1, 2</sup>. A study of Canadian accident statistics at this time should, therefore, be of great general interest. Furthermore, since accidental causes continue to play a large part as a cause of death in Canada, it is desirable that the attention of health officers be drawn to the known facts and present status of this problem.

### *The General Problem*

A summary of the mortality from accidental causes† in Canada, 1933, is given in table I.

Table I shows that in 1933 5,147 deaths, over 5 per cent of all deaths, were attributed to accidental causes. Automobile, railroad and other land transportation accidents were responsible for 1,342, or 26.1 per cent. Accidental drowning and water transportation accidents contributed 1,027, or 20.0 per cent of the total. A very definite part of the mortality from accidental causes occurred in factory and workshop, mine and quarry. The total industrial fatalities for 1933 numbered 808, or 15.7 per cent of all accidental deaths<sup>3</sup> and the total for 1934 promises to be much higher.

Broadly, one may group accidents in three classes: home, industrial and public (including automobile) accidents. No reliable data for Canada

on home accidents are available but an estimated distribution on this basis for Ontario, 1934, would be (a) home 35 per cent, (b) industrial 17 per cent, (c) automobile 24 per cent, (d) other public accidents 25 per cent. Thus, while the major portion of this study is directed toward the general problem and to road accidents in particular, it must be kept in mind that accidents in the home, in industry, and other public accidents including drowning, are of very great importance.

### *Accidental Deaths as a Factor in Total Mortality*

In 1933 accidental causes ranked seventh among the chief causes of death in Canada. In Ontario this group ranked fifth. In Canada, 1933, accidental causes were responsible for four times as many deaths as diabetes mellitus. More deaths were attributed to accidental drowning than to diphtheria and whooping cough together; accidental burns caused more deaths than measles and scarlet fever; automobile accidents were responsible for three times as many deaths as typhoid fever. The mortality from all accidental causes shows no tendency to decline and in Canada (excluding Quebec) this group of deaths exceeds pulmonary tuberculosis in importance.

The benefits paid by the Metropolitan Life Insurance Company in deaths from these causes are further indication of their importance. In

\*Presented before the Section of Vital Statistics and Epidemiology at the Twenty-fourth Annual Meeting of the Canadian Public Health Association, Toronto, June, 1935.

†Throughout this paper the term "accidental causes" includes rubrics No. 176 to No. 198 of the International List of Causes of Death, Revision of 1929; i.e., it comprises all those deaths spoken of as due to external causes excluding suicide and homicide.

1924, 9 per cent of total disbursements was paid for deaths due to accidental causes. In 1933 this proportion exceeded 10 per cent and in 1934 it was 11 per cent. In 1924 1.9 per cent of the total went to the estate of persons dying of injuries sustained in automobile accidents. In 1933 this was practically 4 per cent and in 1934, 4.4 per cent.

excluding Quebec, 3,873 accidental deaths forming 5.5 per cent of all deaths—a rate of 50.3 per 100,000.

During the last decade Canada has ranked second only to the United States among the countries of the world in mortality from accidental causes. The significance of this large body of mortality, aside from any consideration of morbidity at all, is

TABLE I  
DEATHS FROM CERTAIN ACCIDENTAL CAUSES  
Canada, 1933

Cause	Number	Rate per Million Living	Per cent of Total
Automobile and motorcycle accidents	955	92	18.6
Railway accidents	210	20	4.1
Other land transportation accidents	177	17	3.4
Water transportation accidents	216	21	4.2
Air transportation accidents	23	2	0.4
Accidental drowning	811*	79	15.8
Accidents in mines and quarries	69	6	1.3
Accidents caused by machines	158	15	3.1
Accidental burns	329	32	6.4
Accidental poisonings (including toxic gases)	160	15	3.1
Accidental injury by firearms	174	17	3.4
Other accidental causes†	1865	175	36.3
Total	5147	482	100.0

\*Deaths from drowning in water transportation deleted (185).

†Accidental mechanical suffocation, 126; injuries by animals, 91; excessive heat or cold, 115; conflagration, 174; others, including accidental falls, 1,359.

Statistical data for the registration area of Canada during the 10 years 1921-1930 show that the proportion of all deaths due to accidental causes in Canada tended to increase. In 1922, in the registration area of Canada (Quebec excluded), there were 3,565 accidental deaths forming 5.2 per cent of deaths from all causes with a rate of 54.9 per 100,000 population. In 1934 there were 4,759 forming 6.5 per cent of all deaths, the rate being 64.6 per 100,000. In this year the toll exceeded that from all forms of tuberculosis. In the last three years there has been some decline in this mortality as might be expected on account of reduced activity in industry and lessened motor traffic; but still in 1933 there were in Canada,

great. It means that some of the ground which has been gained by preventive efforts in the field of communicable disease is being lost.

#### *Accidental Deaths as a Factor in Mortality at Ages*

The toll of accident is particularly striking in children and adolescents, as indicated in table II.

Of the deaths in children ages 1-4 years in Canada, 1932, accidental causes provided 10.9 per cent and this group was exceeded only by pneumonia and diarrhoea and enteritis. In the age-group 5-14 years these causes ranked first in importance and were responsible for practically 1 death in every 4 which occurred. In the adolescent and

adult groups, age 15-19 and 20-49 years, only tuberculosis exceeded them in importance and they provided 16.5 and 11.0 per cent of all deaths respectively. Even at all ages, these

TABLE II

## ACCIDENTAL CAUSES AS A FACTOR IN MORTALITY

Canada, 1932

Age-Group	Per cent of Deaths due to Accidental Causes	Rank as a Cause of Death
1-4	10.9	Third
5-14	23.9	First
15-19	16.5	Second
20-49	11.0	Second
50-59	4.6	Fifth
60-69	2.8	Eighth
All Ages	5.2	Seventh

causes ranked seventh in importance as a cause of death—5.2 per cent of all deaths for this year being in the accident group.

The average age at death from various accidental causes in table III further emphasizes the toll at young ages.

TABLE III

## AGE AT DEATH IN CERTAIN ACCIDENTAL CAUSES

Canada, 1932

Cause	Age at Death
Accidental burns*	21.6 years
Accidental drowning*	26.1 "
Accidental injury by firearms	28.4 "
Accidents in mines and quarries	32.8 "
Accidents by machines	36.7 "
Automobile and motorcycle	36.3 "
Railway accidents	41.1 "
Street car accidents	50.5 "
Other land transportation	38.3 "
Water transportation	30.7 "
Air transportation	31.4 "

\*Deaths included here are also classed under other heads, e.g., water transportation accidents.

The average age at death in Canada at the present time is over 50 years.

In contrast, the average age for accidental burns is 21.6 years, accidental drowning 26.1, and for automobile and motorcycle fatalities 36.3 years.

*Age and Sex Variation in Mortality from Accidental Causes*

In early childhood and in late adult life the part played by accidental deaths in total mortality is much the same in males as in females. In the intervening years, however, there are marked differences. These differences are illustrated in table IV which gives the age specific rates by sex and the proportion which accidental deaths form of total deaths from all causes by age and sex in Canada, 1931.

At all ages, except 70 and over, the male rate is definitely higher than that in females. In both sexes the mortality reaches its minimum at ages 10-14 years, and rises to a peak at either end of the life span. This is illustrated in figure I. The trend of

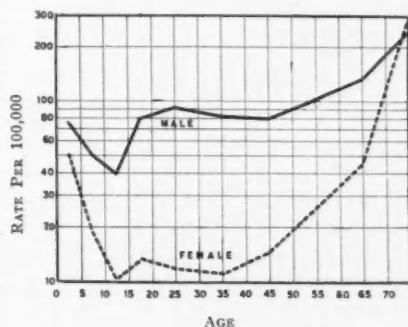


FIGURE I

Accidental Deaths, Canada, 1931  
Sex Specific Mortality Rates by Age

the female rate is strikingly similar to the trend of mortality by age from all causes—i.e., a U-shaped curve. The male curve is somewhat different and further investigation into the particular causes contributing to this mortality will probably explain, to some extent, these variations. Differences in exposure to risk as in industry, as drivers of motor vehicles (4 male

drivers to every female driver in Ontario) and in water exposures, etc., are doubtless major factors in these variations. During 1933, in Canada, for example, there were more than 7 male deaths by drowning for 1 in females. Mechanical suffocations were twice as frequent in males as in females, practically all fatal machine accidents were in males, and 3 males

all deaths in 1931 were due to accidental causes. These sex variations are of considerable interest and significance.

#### *Road and Rail Mortality in Canada*

Because of their preventable character and because of the heavy toll in injury and death which they exact, rail and road accidents are of

TABLE IV  
MORTALITY FROM ACCIDENTAL CAUSES BY AGE AND SEX  
Canada (all provinces)—1931

Age	Males			Females		
	Deaths	Rate per 100,000	Per cent of total deaths	Deaths	Rate per 100,000	Per cent of total deaths
0-4	405	74.6	2.8	273	51.4	2.4
5-9	289	50.5	23.3	104	18.6	10.8
10-14	216	39.8	26.3	55	10.4	6.8
15-19	417	79.4	31.9	69	13.4	6.1
20-29	800	91.6	27.7	99	12.0	3.5
30-39	591	81.3	21.0	76	11.3	2.5
40-49	532	79.5	12.7	82	14.6	2.5
50-59	468	100.4	8.3	100	25.8	1.6
60-69	362	130.6	4.7	128	51.6	1.6
70 & over	418	240.7	2.8	485	283.9	3.4
All ages	4524	84.3	8.0	1472	29.5	3.1

were killed in motor accidents to every female. These facts, however, do not explain the great excess mortality in males over females in the primary school group—age 5-14 years—in which the male mortality (table IV) is about 3 times that in females. The particular volume of this mortality among males is further emphasized by the fact that the death rates from these causes were higher in every age-group than for pulmonary tuberculosis.

The proportions which accidental deaths form of total deaths by sex at ages are also shown in table IV. The data indicate that in females, childhood is the period of most importance, while in males the toll of accidental deaths extends in much greater volume throughout the whole period of childhood and middle adult life. Thus, among males from age 5 to 39 inclusive, more than one-quarter of

particular interest. The high position of Canada among the countries of the world in motor accident mortality is indicated in figure II. Only the

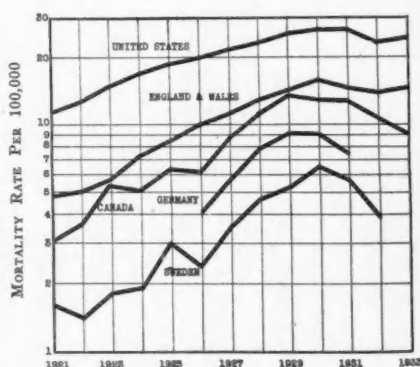


FIGURE II  
Mortality from Automobile Accidents in Certain Countries, 1921-1933



United States, and England and Wales have higher mortality rates. The relatively more favourable position of Germany is interesting in relation to extensive efforts which have been made in that country to control motor accidents. Table V gives the death rates per million living from road and rail accidents in Canada for the 13-year period 1921-

Canada appears to be about four times that in England and Wales<sup>4</sup>. Part of this difference may be due to differences in classification. The statistical practice in Canada re railroad-crossing accidents has been that if the person killed was on foot, the death is classed as a railroad accident, and if in an automobile, as an automobile accident. "The basis

TABLE V

## MORTALITY FROM ROAD AND RAIL ACCIDENTS IN CANADA\*

Death Rates per Million Living

Year	Motor Accidents	Railway Accidents	Street Car Accidents	Other Land Trans- portation Accidents	Road & Rail Mortality	Road Mortality†
1921	30.7	32.1	3.4	....	66.2	34.1
1922	36.5	36.6	3.2	9.2	85.6	49.0
1923	54.2	43.7	5.0	19.5	122.4	78.7
1924	51.2	43.6	3.5	15.5	113.8	70.2
1925	63.1	33.9	4.5	15.6	117.0	83.1
1926	61.9	52.2	5.3	18.1	137.5	85.3
1927	88.0	43.8	5.6	15.1	152.4	108.6
1928	113.0	47.1	4.6	22.9	187.7	140.6
1929	134.9	44.0	5.9	17.9	202.7	158.7
1930	129.2	42.2	3.7	15.9	190.9	148.7
1931	128.3	29.1	3.7	22.2	184.7	155.6
1932	106.7	25.7	3.8	20.0	156.2	130.5
1933	90.8	22.3	1.7	15.9	130.7	108.4

\*Registration area as of 1921 (i.e., excluding Quebec).

†Includes automobile, street car, and other land transportation accidents.

1933 (registration area of 1921). (Road accidents include automobile, motorcycle, street car, horse vehicle and other land transportation accidents.)

The data illustrate the decided increase in the mortality from automobile accidents. Since 1921 the death rate has almost trebled, and the total mortality from road accidents is now more than 3 times what it was in 1921, while the mortality from road and rail accidents combined in 1933 was double that in 1921. The mortality from automobile accidents shows a peak in 1929 as we might expect. The mortality from rail accidents has shown a consistent decline since 1926, the rate for 1933 being the lowest rate of the period. In spite of this, railroad mortality in

of this choice is the great public interest in the danger of automobile accidents and the general fact that trains are running on schedule or a fixed track and therefore the responsibility for the accident rests with the automobile or its driver"<sup>5</sup>.

In drawing attention to road accidents, let it not be forgotten that in 1933 drowning caused more deaths than did automobiles. This fact is not well recognized and it offers a real challenge to safety and health education agencies.

## THE ACCIDENT PROBLEM IN ONTARIO

The general features of the problem of accidental deaths which have been outlined for Canada are also true of Ontario. During the last 10 years, from 4.9 to 6.6 per cent of all deaths

have been attributed to accidental causes. For the five-year period 1928-1932, the average was 6.1 per cent. This proportion is similar to that in Canada as a whole and is a most significant volume of mortality. The distribution of these deaths by age is given in table VI.

TABLE VI  
ACCIDENTAL DEATHS BY AGE

Per cent of All Causes Ontario, 1928-32			
Age	Accidental Deaths		Per cent due to Accidental Causes
	No.	%	
0-1	255	2.6	1.0
1-4	774	6.9	12.5
5-9	653	5.8	21.8
10-14	499	4.4	21.6
15-19	727	6.4	20.7
20-29	1,536	13.5	17.6
30-39	1,224	10.8	12.4
40-49	1,141	10.1	8.4
50-59	1,040	9.2	5.4
60 & over	3,422	30.2	3.6
All ages	11,339	100.0	6.1

Of particular interest in this table are the age-groups 5 to 19 years. During this age-period 1 death in every 5 is due to accidental causes. In 1931-1933 with further reduction in death from diphtheria, etc., the importance of accidents as a cause of death became even greater. In 1933, for example, over 25 per cent of the deaths at ages 10-14 were due to accidental causes.

#### *Industrial Accidents*

The hazard to health of accident in industrial fields is great. The report of the Workmen's Compensation Board of Ontario shows, for example, that during the year 1931 there were 45,239 accidents, almost half of which caused disabilities lasting more than 7 working-days. This group included 2,496 cases of permanent disability and 231 deaths. For every death there were thus 196 persons injured and 11 persons totally disabled. In 1932-1934 inclusive, 934 deaths, or 15.4 per cent of all accidental deaths were of industrial origin.

#### *Automobile Accidents as a Cause of Death in Ontario*

The data included in table VII indicate the trend of mortality from automobile accidents in Ontario from 1917 to 1934.

TABLE VII  
DEATHS FROM AUTOMOBILE ACCIDENTS BY SEX  
Ontario—1917-1934

Year	Males		Females	
	Deaths	Rate*	Deaths	Rate
1917	40	2.8	9	0.7
1918	40	2.8	19	1.4
1919	72	5.0	19	1.4
1920	75	5.1	44	3.1
1921	81	5.5	27	1.9
1922	80	5.3	23	1.6
1923	148	9.7	60	4.0
1924	151	9.7	54	3.6
1925	175	11.1	81	5.3
1926	179	11.1	63	4.0
1927	267	16.3	120	7.6
1928	318	19.1	119	7.4
1929	403	23.8	153	9.3
1930	383	22.2	134	8.1
1931	438	25.0	136	8.1
1932	377	21.3	120	7.0
1933	299	16.7	117	6.8
1934†	393	21.6	119	6.8

\*Rate per 100,000. †1934 figures tentative.

Since 1917 this mortality has risen from 1.8 per 100,000 to 14.3 in 1934 with peaks of 16.7 in 1929 and 1931. This is an eight-fold increase for the 18-year period. This aspect of mortality is a grave concern. In 1934 about 15 deaths in every 1,000 were automobile fatalities. The dramatic increase is, of course, closely related to motor traffic and highway developments but increase in motor traffic alone does not account for the trend in mortality. This is borne out by the fact that the trend in mortality is still definitely upward even when the mortality is expressed per 10,000 motor vehicles instead of per 100,000 population. This indicates that other factors as increasing speed, increasing distances travelled, increasing weight of vehicles, etc., are playing a part in the rising toll of these preventable deaths. Table VII also gives mortality rates for each sex and these data

show that throughout the period studied the male death rate was 2 to 3 times the female rate and that both have increased in like proportion.

How large a part do deaths from automobile accidents play at various ages? From 1928-1932, on the average 1.5 per cent of all deaths in Ontario were due to automobile accidents. Table VIII gives the pro-

TABLE VIII  
THE PART PLAYED BY AUTOMOBILE  
ACCIDENTS IN MORTALITY  
Ontario—1928-1932

Age	Automobile Fatalities		Per cent of deaths from all causes
	Number	Per cent	
1- 4	170	6.6	2.8
5- 9	235	9.1	7.8
10-14	104	4.0	4.5
15-19	162	6.2	4.6
20-29	419	16.2	4.8
30-39	298	11.5	3.0
40-49	322	12.5	1.3
50-59	283	11.0	1.5
60 & over	578	22.4	0.6
All Ages	2581	100.0	1.5

portion of all deaths which were due to automobile accidents at various ages for the 5-year period 1928-1932. Deaths under 1 year of age are excluded.

The age period at which automobile fatalities were most prominent was at 5-9 years when about 8 deaths in every 100 were automobile fatalities. In all age-groups from 1 to 40, at least 3 deaths per 100 were due to automobile accidents.

#### *Age and Automobile Mortality*

During the period under review, certain interesting age changes have occurred in deaths following injuries sustained in automobile accidents. Deaths and specific death rates for the age-groups 0-14 years and 15 years and over for Ontario, 1917-1934, and the percentage distribution in these two groups are given in table IX.

In the 3-year period 1917-1919 as many automobile fatalities occurred among children under 15 as in persons 15 and over. In 1934 less than one-quarter as many fell in the childhood group. This shift in the age distribution of the deaths from this cause has been persistent as indicated by figure III. In spite of this change the fact

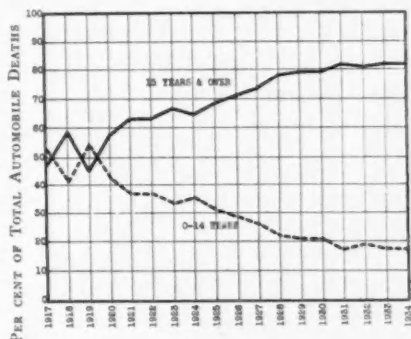


FIGURE III  
Automobile Mortality, Ontario, 1917-1934  
Per cent Distribution by Age

remains that one in every 5 or 6 persons killed in an auto accident is a child under 15 years of age, and in 1932, 74 out of the 94 children killed in motor accidents were children playing in the street.

In the United States, and in England and Wales, this shift in age mortality has also occurred. In England and Wales in 1922, one-third of all victims of accidents on the road were children, while in 1932 the proportion was less than one-quarter. The shifting of the distribution<sup>6</sup> of these preventable deaths is of great interest and some satisfaction since it must mean that certain factors have been at work lessening the risk of children dying in motor accidents compared with that of adults. Much more important, however, is the fact that the death-rate from automobile accidents in children has trebled since 1917. The increase in the rate among adults is, of course, much more striking, being now 13 times what it was in 1917. In comparing the two age

groups, it is noteworthy that until 1926 the specific mortality rate among children under 15 years of age exceeded that in the group 15 years

The facts recorded in table X make it very clear that hundreds of hospital beds are now being used for the treatment of accident cases which would

TABLE IX  
MORTALITY FROM AUTOMOBILE ACCIDENTS BY AGE  
Ontario—1917-1934

Year	0-14 Years			15 Years and Over			All Ages	
	No.	Rate*	Per cent	No.	Rate*	Per cent	No.	Rate*
1917	26	3.1	53	23	1.2	47	49	1.8
1918	24	2.9	41	35	1.8	59	59	2.1
1919	49	5.7	54	42	2.1	46	91	3.2
1920	51	5.9	43	68	3.4	57	119	4.1
1921	40	4.5	37	68	3.3	63	108	3.7
1922	38	4.3	37	65	3.1	63	103	3.5
1923	68	7.6	33	140	6.6	67	208	6.9
1924	73	8.1	36	132	6.1	64	205	6.7
1925	79	8.7	31	177	8.0	69	256	8.2
1926	69	7.5	29	173	7.7	71	242	7.6
1927	102	11.0	26	285	12.4	74	387	12.0
1928	96	10.2	22	341	14.6	78	437	13.3
1929	114	12.0	21	442	18.5	79	556	16.7
1930	109	11.4	21	408	16.8	79	517	15.7
1931	103	10.7	18	471	19.0	82	574	16.7
1932	94	9.7	19	403	16.1	81	497	14.3
1933	76	7.7	18	340	13.4	82	416	11.8
1934†	91	9.2	18	421	16.3	82	512	14.3

\*Rate per 100,000.

†1934 figures tentative.

and over. In 1917 the mortality rate in children was twice that at older ages; now the situation is practically reversed.

#### OTHER PUBLIC HEALTH ASPECTS OF AUTOMOBILE ACCIDENTS

Since September, 1930, the Highway Traffic Act of Ontario (Part XIV, Sec. 88-91) has provided for the reporting of road accidents involving personal injury or property damage in excess of fifty dollars, and for the recording of accident statistics. Table X shows the frequency of accidents by types in Ontario, 1931-1934\*.

During these four years the ratio of injuries to deaths was 17:1. This ratio is not as high as that recorded in England and Wales where in 1932 there were 30 persons injured to 1 killed, though some of the discrepancy may be due to differences in reporting or to the heavier cars in use in Canada.

otherwise be available for the treatment of disease. The economic loss represented by this mortality and morbidity is tremendous. For 1934 the loss from property damage alone was close to one million dollars. The picture for the future is not bright because further increase in amount and speed of traffic is to be expected. The number of persons killed during 1934 increased by a hundred and injuries rose to 8,990, the highest figure in the history of provincial records and more than 1,000 more than in 1933.

It is of interest to know who the victims in motor accidents are. Table XI gives a classification of the victims of motor accidents as reported to the Department of Highways, Ontario, 1932-1934.

Data for the three years 1932-1934 show that 44 per cent of fatalities and 35 per cent of injuries were among pedestrians, while 27 per cent

of the deaths and 35 per cent of injuries were in passengers. Nineteen per cent of the deaths and 18 per cent of the injuries were in drivers. Thus about 4 times as many deaths and injuries occurred in pedestrians and passengers together as in drivers.

cent of all deaths and 33 per cent of persons injured were the result of accidents involving collision between automobile and pedestrian.

#### *Age of Driver*

An attempt was made to assess age

TABLE X  
ROAD ACCIDENT RECORDS  
Ontario—1931-34

Year	Total Accidents Recorded	Persons Killed	Persons Injured	Property Damage only
1931	9,241	571	8,494	2,525
1932	9,171	502	8,231	2,528
1933	8,634	403	7,877	2,297
1934	9,645	512	8,990	2,406

The official returns for England and Wales, 1932, also showed that while over 54,000 persons were killed or injured on motor vehicles to which accidents were attributed, over 63,000 other persons were also killed or injured<sup>8, 9</sup>. The drivers of the vehicles

of driver as a factor in automobile accidents by computing a specific driver-age rate, using the data available on ages of drivers involved in accidents. The population of drivers at ages employed was estimated by applying the per cent distribution of

TABLE XI  
CLASSIFICATION OF VICTIMS OF MOTOR ACCIDENTS  
Per cent Distribution of Fatalities and Injuries  
Ontario—1932-1934

Class of Victims	Fatal Accidents		Injuries	
	Number	Per cent	Number	Per cent
Pedestrian	620	43.8	8,666	34.5
Passenger	386	27.2	8,772	35.0
Driver	274	19.3	4,599	18.3
Bicyclist	83	5.9	2,043	8.1
Motorcyclist	33	2.3	633	2.5
Others	21	1.5	385	1.5

were therefore the cause of the death or injury of a large number of pedestrians.

The relative importance of the various types of motor accident is indicated in table XII.

This table again shows how large a part pedestrian accidents play in the toll of motor vehicles. Forty-four per

drivers by age for 1931 computed by the statistical division of the Department of Highways to the total licensed operators for the 3-year period 1932-1934. Driver age specific rates were then calculated (table XIII).

On this basis the youngest group, under 18, presents not an unfavourable record in comparison, and the

rates are highest in every instance at age 18-24. It is of great interest, however, that the rates at age 65 and over for fatal accidents were as high

In each instance, the female rates are markedly lower, and while it is true that one would have to correct these rates for age, miles travelled,

TABLE XII  
MOTOR MORTALITY AND MORBIDITY BY TYPE OF ACCIDENT  
Ontario—1931-1934

Collision of Auto with	Fatalities		Persons Injured		All Accidents	
	Number	Per cent	Number	Per cent	Number	Per cent
Other automobile	285	14.3	11,616	34.6	14,394	39.2
Pedestrian	866	43.6	11,188	33.1	11,506	31.4
Bicycle	102	5.1	2,510	7.5	2,527	6.9
Fixed object	158	7.9	2,367	7.0	2,410	6.6
Horse vehicle	31	1.6	759	2.3	879	2.4
Motorcycle	35	1.8	759	2.3	713	1.9
Street car	37	1.9	530	1.6	798	2.2
Railroad train	195	9.8	420	1.3	462	1.3
Others	20	1.0	179	0.5	380	1.0
Non-collision	259	13.0	3,264	9.7	2,622	7.1
Total	1,988	100.0	33,592	100.0	36,691	100.0

as in the 18-24 group. These data must, of course, be accepted with reservation since factors other than age *per se* are involved.

occupation and other factors before they could be accepted as true sex values, yet it is hardly likely that the wide differences which exist can

TABLE XIII  
AGE SPECIFIC ACCIDENT RATES\* BY TYPE OF ACCIDENT  
Ontario—1932-1934

Age	Type of Accident			All Types
	Fatal	Personal Injury	Property Damage	
Under 18	3.3	77.3	29.3	109.9
18-24	8.9	125.4	53.6	187.8
25-40	7.0	113.7	53.5	174.1
41-54	6.2	103.4	45.2	154.8
55-64	7.2	96.9	42.1	146.2
65 & over	8.5	104.6	41.7	154.8
All Ages	7.1	111.3	49.8	168.3

\*Accidents per 10,000 drivers.

#### The Sex Factor

In a similar manner rates were computed for each sex for 1931-1934, assuming the sex distribution of drivers for this period to be the same as in 1931. These data are given in table XIV.

be accounted for on such grounds alone.

#### FACTORS IN CAUSATION

There are several other factors to be considered in relation to causation and prevention of motor accidents



including condition of vehicle, condition of the driver, condition of the roadway, adequacy of the lighting on the road or highway, capacity of the driver, action of the pedestrians, accident proneness, etc.

sufferer as a result of road accidents. In 1934 pedestrians were involved in 2,994 motor accidents, or 31 per cent of all accidents, and in 211 or 42 per cent of the fatalities. While responsibility for two-thirds of all accidents

TABLE XIV

SEX SPECIFIC ACCIDENT RATES\* BY TYPE OF ACCIDENT

Ontario—1931-1934

Sex	Fatal	Personal Injury	Property Damage	All Accidents
Male	9.0	137.2	71.6	217.8
Female	3.1	60.5	26.0	89.6
Total	8.1	126.3	65.1	199.6

\*Rates per 10,000 drivers.

*Action of Driver*

Table XV gives a summary of "action of driver" in accidents in Ontario for 1933 and 1934.

These data give some idea of practices which result in accidents.

was attributable to motorists, yet much of the responsibility in the case of accidents involving pedestrians rests with the pedestrians themselves. The records for 1934 show that 23 per cent were children playing in the

TABLE XV

ACTION OF DRIVER IN ACCIDENTS

Ontario—1933-1934

	Fatal Accidents		Personal Injury Accidents		All Accidents	
	Number	Per cent	Number	Per cent	Number	Per cent
Excessive speed	113	39.0	1107	32.3	1898	32.2
Drove off roadway	83	28.6	701	20.5	1097	18.6
On wrong side	58	20.0	773	22.6	1460	24.7
Without right-of-way	16	5.5	459	13.4	799	13.5
Cutting-in	8	2.8	155	4.5	257	4.4
Improper passing*	5	1.7	23	0.7	133	2.2
Failing to signal	1	0.3	109	3.1	207	3.5
No driver	6	2.1	96	2.8	56	0.9
Total	290	100.0	3423	100.0	5907	100.0

\*Passing on curve or hill, on wrong side, or passing standing street car.

Excessive speed, particularly on rural roads, is one of the chief factors and is directly or indirectly involved in 9 out of every 10 accidents.

*Action of Pedestrians*

The pedestrian is the greatest

street. One-half (103) of the pedestrians killed were crossing between intersections or against signals, walking on highways, or crossing highways and coming from behind a parked vehicle. Such evidence demonstrates the fact that pedestrians are too

optimistic and irresponsible in their conduct on road and highway. Another fact of note is that 13 per cent of the fatalities and 16 per cent of the injuries in pedestrian accidents occurred while crossing street intersections where there were no signal lights.

#### *Length of Experience of Driver*

In 1934 78 per cent of the drivers involved in accidents had had a driving experience of 5 years or over. This fact is a very pertinent one because it means that experience alone will not lead to reduction of accidents. Ontario accident records furthermore show that 5.5 per cent of the drivers were involved in 16.8 per cent of accidents. (Further study showed, however, that only in about half of the cases was the so-called "repeater" actually responsible.)

#### *Other Factors*

Much information is now available in the reports of the Ontario Department of Highways on further factors in relation to motor accidents. Statistics for 1934, for example, show that of 14,204 vehicles involved in accidents, 13,194 (93 per cent) were in apparently good condition. Defective brakes and glaring headlights are among the important defects found.

Thirty-two point five per cent of accidents occurred at street intersections, but only 17 per cent of fatal accidents occurred there. Twenty-three per cent of all accidents and 33 per cent of fatal accidents occurred on a straight road.

Data on road and weather conditions so far suggest that when weather conditions are poor, drivers are more careful, and that when accidents occur under such conditions, they are less likely to be fatal.

Over 54 per cent of all the recorded motor accidents in 1934 occurred in the daylight hours. The peak accident period is 5 to 7 p.m., while morning rush hours seem relatively free of fatal accidents. This would suggest that fatigue, and poor vis-

ibility in evening hours are likely factors. Accidents during dusk or darkness appear to be of greater severity since the accident fatality rate is persistently higher at these times.

#### COMMENT

A large proportion of the deaths due to accidents are preventable. Accidental deaths are therefore a public health problem and a social concern. Increase in motor traffic and the speeding-up of transportation and industrial life in general are important factors in a consideration of this problem, and there is every reason to expect a further increase in this direction.

The whole question of accident causation, accident proneness and accident prevention is full of interest. The early work of Greenwood, Woods and others for the Industrial Health Research Board<sup>10, 11, 12</sup> and the work of the National Institute of Industrial Psychology, has opened up a very important field. Statistics of accidents, fatal and non-fatal, will doubtless provide some further lead in this problem.

Safety education and strict enforcement of traffic regulations are adjuncts to prevention. The "human factor" in accidents, however, must not be overlooked and although the precise place of physical examination and psycho-physical selection tests in a scheme for prevention of accidents must await further developments, yet no attack upon this problem will likely succeed without a consideration of those things, particularly without regard to the phenomenon of accident proneness.

#### SUMMARY

1. More than 5 per cent of all mortality is due to accidental causes. This toll is greater than that of pulmonary tuberculosis in Canada (excluding Quebec), and from age 5 to 49 the mortality in Canada from these causes in 1932 was exceeded only by all forms of tuberculosis.

2. The toll in males as a whole is about three times that in females.

3. In early childhood and old age the mortality is high in both sexes, while in the intervening age-groups from 5 to 69 the mortality rate in males and the per cent of all causes due to this accidental group is from 3 to 8 times as great in males as in females.

4. Automobile mortality in Canada during the period 1922-1933 has more than trebled and road mortality has more than doubled. Rail mortality has shown an interesting tendency to decline in recent years.

5. In Ontario the automobile mortality rate is 8 times what it was in 1917. In 1934, 15 deaths in every 1,000 were due to this cause.

6. As a factor in total mortality, deaths from motor accidents are most important at ages 5-9 but for 1928-1932, from age 1 to age 39, 3 or more deaths per 100 were due to motor accidents.

7. The male motor mortality rate throughout is about 3 times that in females. Both have shown corresponding increases during the period.

8. Though there has been a marked reduction in the per cent of all motor fatalities occurring among children under 15, yet the specific death rate in this group has trebled since 1917. The rate in persons 15 years and over is now 13 times that in 1917.

9. For every motor fatality in Ontario, 1931-1934, at least 17 persons were injured.

10. Four times as many deaths and injuries occur in pedestrians and passengers together as in drivers of motor vehicles.

11. Interesting differences in age and sex specific driver accident rates exist in Ontario experience.

12. Excessive speed, particularly on rural roads, is one of the chief factors concerning the driver in motor accident.

13. In accidents involving pedestrians, they themselves are responsible in a large number of instances.

14. Experience is by no means a cure for accident since 78 per cent of the drivers in accidents in 1934 had 5 years' experience or more.

#### ACKNOWLEDGMENT

The author wishes to express his appreciation to the Division of Accident Statistics of the Ontario Department of Highways and to the Division of Vital Statistics of the Dominion Bureau of Statistics at Ottawa for co-operation in providing certain of the data upon which this study is based.

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# Mental Hygiene in a Social Agencies Health Service

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THE population of Montreal falls into four main groups: French-speaking Roman Catholics, English-speaking Roman Catholics, Protestants, and Jews. The social agencies are divided on the same basis, each group having a central organization for financial and other purposes.

Financial Federation of the Montreal Council of Social Agencies includes not only the Protestant social agencies but also a number of non-sectarian organizations, such as the Child Welfare Association, the Victorian Order of Nurses, the Mental Hygiene Institute, the Griffintown Club, and the Parks and Playgrounds Association. The non-sectarian agencies provide some service for the French-speaking community. The Federation of Catholic Charities and the Federation of Jewish Philanthropies recognize the non-sectarian character of these agencies, and so do not include voluntary health agencies in their own organizations. The Federation of Catholic Charities makes a contribution towards the maintenance of three voluntary health agencies in Financial Federation.

The social agencies in Financial Federation found it necessary to provide medical care for their clients in their own homes. The hospitals gave service to in-patients and to patients attending the outdoor departments, but medical care in the home was not provided by any agency, and the indigent sick were practically dependent on the generosity of the medical profession for the care which they needed.

A survey, made in 1929, revealed a

great variation in the type of medical service provided by the different social agencies. Following upon the survey, a Health Service was organized by Financial Federation under a special committee of the Child Welfare Association, operating with a separate budget and a separate staff, but under the same executive and medical direction. The primary object of the Service was the promotion of positive health. In addition, medical care was provided for the clients of the agencies in their homes and in institutions.

The staff comprises seven part-time physicians, three part-time dentists, one part-time and three full-time nurses, and a mental hygiene worker. The Health Service clinic, consisting of a waiting-room, an examining-room, a dressing-cubicle and a dental clinic, is located in the Forum Building, in which building are housed the central offices of most of the non-institutional agencies in Financial Federation. The clinic is well-equipped and has been made most attractive.

In order to make the service more accessible, particularly for the clients of the Family Welfare Association, Health Service clinics are conducted in the district offices established by co-operation with other agencies. The only active treatment given is dental service. Examinations at clinic are made by appointment. The social agencies are encouraged to have their clients pass through the clinic for a periodic health examination, and each agency is given a report on the physical condition of each of its clients. If further examination or treatment is

required, the client is referred to a hospital clinic. In the Health Service clinic, instruction is given to the client with regard to proper diet, rest, regular elimination, and so forth.

The healthy individual is one who is not only free from disease but who has attained a good development of his inherited capacities. For the reason that the individual is a unit, and also because of the relation of body and mind, it is essential that the healthy person enjoy both physical and mental health. Physical health is desirable, but physical health alone is hardly worth having, because the happiness of the individual and his usefulness are much more dependent on his mental health. Mental health implies freedom from any abnormal mental condition, together with such an adjustment to the world in which he lives as to give satisfaction to the individual in a way that is socially acceptable to the community. The mentally healthy person is happy, efficient and effective.

Since mental health and physical health cannot be separated and the individual has to be considered as a whole, it seemed desirable to include, on the staff of the Health Service, a mental hygiene worker, and, in this way, round out the service. The Health Service, taking this broad attitude, has endeavoured to combine a physical and a mental hygiene approach in its consideration of the health needs of the clients of the social agencies. This means a consideration of the health needs of the whole individual, not merely a physical examination.

When the Health Service physician fails to find a physical basis for the client's complaint, he does not send the client away with: "Forget about it; there is nothing wrong with you", but he seeks for the cause, knowing that many complaints have not a physical basis. This is what was done in the case of Mrs. T., who was losing weight, and appeared tired and worried. There were no abnormal

physical conditions discovered upon examination. The clinic physician had her return regularly in order to keep her under observation. In the home the mother-in-law dominated; she managed the household, disciplined the only child, and handled the money; the patient had no responsibility. The physician talked with the husband and explained to him that this unsatisfactory home environment might be the reason for his wife's poor health. The husband undertook to correct the unsatisfactory condition, with the result that the patient has regained normal health, and the possible danger of a mental illness has been averted.

The Health Service clinic offers an opportunity to discover mental hygiene problems of this type in the individual members of a family group. If, upon examination, any serious or difficult problem is found, the agency concerned is advised to refer the client to the Mental Hygiene Institute where a psychiatric examination is made and treatment outlined. Minor problems are dealt with in the Health Service clinic and instruction is given regarding mental health habits.

In all cases, whether physical or mental, it is the responsibility of the social agency to see that the recommendations of the Health Service are carried out. In practice, this means that the social worker becomes a health worker in the home, under the general guidance of the Health Service. The case of Mary will serve to illustrate how this is done. Mary was referred by a social agency for examination. No physical cause was found for her loss of weight and poor appetite. She was also failing in school. Following discussion with the social worker, it was arranged to refer the child to the Mental Hygiene Institute, where a psychiatric examination was made. The cause of Mary's complaints was the fact that a twin sister received the entire attention of the father. Mary recovered when the father changed his attitude towards her.

Some agencies, such as the settlements, do not attempt to do case work. For the clients of these agencies the Health Service worker prepares the necessary history for cases requiring psychiatric examination and gives home supervision to a limited number. This is how the case of John was dealt with. John was found to have poor posture; he had lost weight and had enuresis. He was also having a difficult time in school and was playing truant. His home was visited and it was found to be in confusion. Meals were served at all hours and were prepared mostly from tins. John was whipped at school and at home. A psychometric examination at the Mental Hygiene Institute showed the boy to be very much retarded mentally, which would account for his being unable to cope with his school work. The psychiatrist advised the school principal concerning the boy's intelligence and suggested that he be placed in a special class for retarded children. The examiner felt that the anti-social behaviour and the enuresis would clear up when the boy found himself in an environment where he would get satisfaction in suitable work.

In addition to the routine work of the Health Service, regular visits are paid to one institution where assistance is given in habit training and direction in recreation. Conferences are held in this institution for consideration of general and positive health problems.

Health Service staff conferences are held at which the staff discusses such problems as the treatment of enuresis. Other conferences have been devoted to case studies and, during the past years, attention has been given to cases presenting a mental hygiene problem, with Doctor W. T. B. Mitchell, Director of the Mental Hygiene Institute, presiding. This type of conference is of particular value because it brings together those whose outlook has been

primarily directed towards the physical, to discuss individual case problems with others who are interested in both the physical and the mental.

The following is the type of case which lends itself well to discussion at these conferences. Mr. and Mrs. B. were worried over a period of three years, due to the fact that Jean, aged seven-and-a-half, masturbated. The parents regarded this as a serious matter and as something of which to feel ashamed. The history of the child showed a girl with superior intelligence who, since the birth of a brother, had evidently felt neglected, because her relatives were now directing their attention to the brother. It was at this time that the parents noticed Jean was masturbating. The significance of masturbation was discussed. It was pointed out that, during the first months of life, the child is entirely self-centred and that he secures satisfaction through his own feelings and sensations. At this period, as the child continues to find most of his satisfaction in self, auto-erotic practices are normal. If the child is not interfered with, he lives out these interests. If, however, as in the case of Jean, the child loses the feeling of security, he will likely revert to infantile behaviour, such as masturbation. Jean's parents were instructed as to the meaning of the child's behaviour, and were advised to ignore the habit. To relieve the child's feeling of guilt, which had resulted from their scolding, punishment and worry, it was recommended that arrangements be made whereby Jean might secure satisfaction in some outside interests.

Thus the Health Service, in addition to providing service, offers an excellent opportunity to develop methods for the practice of preventive medicine, from the point of view of both physical and mental health.



# The Quantitative Estimation of Indol by Means of Dialysis\*

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IT has been shown by one of us<sup>1</sup> that a portion of the indol formed in a tryptophane broth culture may be obtained in clear solution by dialysis through a cellophane membrane. The dialysate may then be subjected to the Ehrlich paradimethylaminobenzaldehyde test or some modification thereof, and the test colour extracted with chloroform. Positive tests were obtained in this manner from cultures containing one-eighth of the amount of indol required in order to show colour when the test was performed in the usual way<sup>2,4</sup> using the crude culture fluid. A rapid and convenient technique for obtaining culture dialysates was described. Subsequent experience with this method has confirmed its value, and has indicated certain precautions and refinements. These precautions are here outlined, it is indicated that the dialysis test may within limits give satisfactory quantitative as well as qualitative results, and a set of permanent colour standards against which the test extracts can be compared is described.

## TECHNIQUE FOR QUALITATIVE TEST

The micro-organism to be tested for indol production is inoculated into a 5 cc. quantity of sterile tryptophane broth contained in a 5"x $\frac{1}{2}$ " lipless culture tube. After 48 hours' incubation at 37°C., the cotton plug is removed and an unpunctured sheet of cellophane measuring about 6"x6" is folded over the mouth and sides of the tube in umbrella-like fashion, and is bound to

the tube by means of a rubber band. The band should be placed over the cellophane about 2 $\frac{1}{2}$ " from the mouth of the tube. The cellophane bag thus formed is then slid part way off the culture tube, remaining bound to it by the rubber band. The tube is now inverted, allowing the culture fluid to flow from the tube into the dialyzing bag. The inverted tube with its dependent bag still attached is then suspended in a large test tube (about 8"x1" containing 5 cc. of a saline solution isotonic with the culture fluid. A simple spring wire hanger, provided with a loop to grasp the small tube and a hook to hang on the edge of the large tube, (or some similar device) is necessary to keep the dialyzing sac properly suspended in the saline solution. More elaborate methods of arranging the dialyzing apparatus should be avoided, as they are both space- and time-consuming and tend to defeat the essential rapidity and simplicity of the procedure. The large test tube need not be plugged. Proper care is, of course, essential in using this method in the study of pathogenic organisms.

The unit, assembled as above, is placed in a refrigerator overnight. The inverted tube with its bag is then removed, and any fluid adhering to the outer surface of the cellophane is washed down into the dialysate with a small amount of saline from a wash bottle. The Ehrlich test for the presence of indol is now performed on the dialysate according to one of the

\*Presented at the Christmas meeting of the Laboratory Section, Canadian Public Health Association, Toronto, December 31, 1935.

accepted methods. We prefer that of Fellers and Clough<sup>3</sup>, a résumé of which has previously been presented by one of us<sup>1</sup>. The dialysis method will yield results with only one of the grades of cellophane at present on the market, namely "No. 300 plain transparent". Care must be taken to avoid heavier grades, which absorb so much indol as to render the test ineffective; also the waterproof variety much used as wrapping material, and useless as a dialyzing membrane.

#### QUANTITATIVE APPLICATION

Fellers and Clough<sup>3</sup> and others have shown that quantitative estimations of indol in culture media and other menstrua may be made either by direct or by steam distillation of the material, with subsequent performance of the Ehrlich test upon a concentrate of the distillate. The chloroform extracts from such tests are compared with similar extracts from a series of tests carried out with known amounts of indol. We have made a large number of determinations by direct distillation of small quantities of fluid culture in a micro-distillation apparatus, and have obtained very consistent results by this method. However, determinations made in this manner require careful attention during the distillation; if large numbers of cultures are to be dealt with, a great amount of laboratory time is consumed.

With a view to obtaining measurements of fair accuracy by shorter methods, we have compared the consistency of results obtained both by distillation and by dialysis. Fig. 1 shows the results of a representative series in graphic form. For obvious reasons, a culture volume of 10 cc. was used rather than the 5 cc. amount as used in the qualitative test. The form of the dialysis recovery curve is such that an actual indol content of from 8 mmg. to 32 mmg. may be readily appraised. The amount of indol absorbed by the membrane under the conditions of the test renders in-

effective measurements below 8 mmg. per 10 cc. of culture. One must therefore be content to group together all cultures yielding less than this amount. That this treatment is perfectly justifiable for general work must be admitted in considering the fact that the Ehrlich test performed on the crude culture fluid fails even to detect 8 mmg. indol, giving a "trace" only at 12 mmg.<sup>1</sup> That measurements cannot be read off from the dialysis curve for

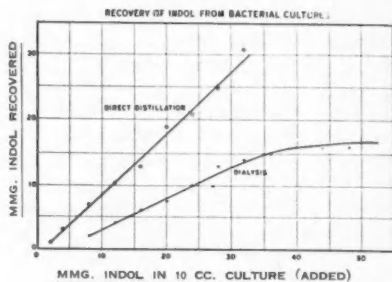


FIGURE 1

amounts over 32 or 35 mmg. is again of little practical significance. Unpublished results from this laboratory, together with the records of Fellers and Clough<sup>3</sup>, indicate that few bacterial cultures are likely to produce more than 25 or 30 mmg. indol per 10 cc. culture under the given conditions.

#### PRECAUTIONS FOR QUANTITATIVE WORK

Seedings from different cultures should be made into 10 cc. volumes of tryptophane broth by means of a standard loop, from suspensions of approximately equal bacterial content; time of incubation and period of ice-box dialysis must be held constant at 48 and 24 hours respectively. The quantities of Ehrlich reagents and time of exposure of the dialysates to these must be uniform, as also the time of extraction by chloroform. We find the most effective time for extraction to be one minute, and the colour should be compared with the standard series exactly one minute after the

extraction is completed. Steps must further be taken to ensure that approximately the same area of cellophane is exposed to the fluids in each dialyzing unit set up. The major error in this direction is eliminated by closely trimming, with a razor blade, the loose ends of cellophane of varying length which project from under the rubber band as a result of the formation of the dialyzing sac. When this trimming is not resorted to, the outer saline solution may creep up by capillary attraction between folds of membrane, with the result that varying amounts of indol will be absorbed by the loose ends.

#### PERMANENT COLOUR STANDARDS

The convenience of the quantitative test was further enhanced by the establishment of a permanent set of colour standards for comparison with the chloroform extract colours obtained in the test. Ordinarily a whole series of Ehrlich reactions must be performed on varying known amounts of indol in aqueous solution, and the chloroform extracts from these used as standards. The colour in such extracts fades rapidly, introducing a large error into the determinations. In testing out a number of organic dyes with a view to matching the indol test colour, a closely corresponding colour was found to be given by solutions of phenol red (phenol-sulphonphthalein). The solutions are made by adding varying amounts of a 0.2 per cent alcoholic solution of the dye to 10 cc. of a phosphate buffer solution at pH 8. One cubic centimeter of each mixture

is then sealed in a small clear glass tube, thus giving a series of standard colours which do not fade for several months. The composition of the standards is shown in fig. II. However, as the intensity of colour in a given dilution may vary slightly depending upon

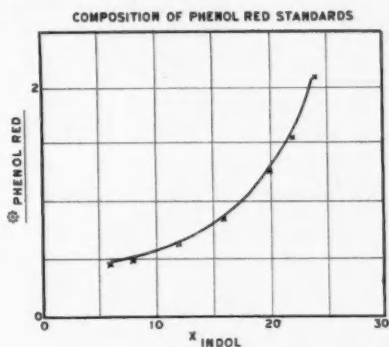


FIGURE II

\*PHENOL RED—Cc. of 0.2 per cent phenol red solution per 10 cc. buffer solution to give corresponding colour.

xINDOL—Mmg. of indol giving colour in 1 cc. of chloroform extract from Ehrlich reaction.

the particular batch of indicator used, it is advisable to calibrate a newly-made phenol red solution against freshly-made Ehrlich test extracts.

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## HIS LATE MAJESTY KING GEORGE V

WITH humble duty and devotion the members of the Canadian Public Health Association pay formal tribute to the memory of our late Sovereign Lord, His Most Gracious Majesty King George V.

In all parts of this Dominion, as of the Empire, consciousness of sorrow has descended in a peculiar way. His voice had conveyed to us as individuals an intimate message of human good-will and, having been heard, gave us a contact which makes our loss a personal one. This sense of loss has deepened the more as we have had recalled to us the details of his life of service and the richness of his character in all those virtues which were activated by a supreme devotion to duty, the welfare of his people, the Empire, and the world at large.

The enthusiastic support given by His Late Majesty and the Royal Family to the general field of medicine, and in particular preventive medicine, was manifest in the encouragement afforded to the rehabilitation of tuberculous patients from sanatoria in village settlements, where the benefits of home life and self-supporting occupation could again be enjoyed. So also do we recall his sympathetic and practical concern with the schemes developed during his reign for the improvement of the health and well-being of the mothers and children of Great Britain, particularly in the congested areas of large cities. Slum clearance measures and the efforts to provide real homes in the place of tenements were matters of his special interest. The deep concern manifested by His Late Majesty in the ravages of cancer was reflected in his approval of the King George V Silver Jubilee Cancer Fund in Canada, whereby the gladness of the Canadian people on that occasion might contribute to the future welfare of this Dominion.

We unite with all the peoples of the British Empire in mourning the death of our gracious and beloved Sovereign, King George V.

## THE PREVENTION AND CONTROL OF ACCIDENTS

A LARGE proportion of the deaths due to accidents are preventable. Accidental deaths are therefore a public health problem and a social concern. It is true that certain measures of control are now being employed but these are essentially of a general character and, while they are of great value, they fail to strike at the root of the problem.

It is in specific measures of prevention and control that our real hope lies but here our knowledge is grossly inadequate. Since the time of the work of Greenwood and Woods in 1919, a systematic study has been undertaken by the Industrial Health Research Board of England on the part played by individual susceptibility in the causation of accidents. These workers demonstrated that accidents were not distributed by chance but that "certain individuals in any trade group were more liable to incur them than their fellows exposed to equal risk." Recent work is serving to emphasize further the importance of the psychological factor in the etiology of accidents on the road and in the factory. The most recent report suggests that it may perhaps be possible to diagnose "accident proneness" by clinical and experimental methods.

Since the human factor in motor accidents, for example, is of great importance, it is obviously essential that pedestrians be encouraged to observe the rules in traffic control. Motorists must, however, bear the greater part of the responsibility for the protection of child life from motor accident because children are in the main irresponsible persons. Excessive speed, too, is a real factor over which control should continue to be exercised. Another phase of prevention concerns physical examination of drivers. In certain European countries, a physical examination is required before a license can be secured; vision, auditory and muscular complement are criteria used. The relatively favourable position of Germany among the countries of the world in motor mortality is of interest in this connection. In England provision has been made in the new Highway Act of 1934 for requiring, at the discretion of the Minister, that new drivers undergo a test of competence to drive. This is the outgrowth of scientific investigations which show that a relatively small proportion (25 per cent) of a group is involved in a large proportion (75 per cent) of the accidents occurring.

In an article in this issue, Dr. Sellers presents adequate evidence to indicate that accident is a major health hazard and a national problem of great importance, and this would seem to provide ample reason why some of the moneys collected from motorists should be expended in research upon the factors concerned in road accidents. The efforts which have been made and the legislation provided to meet the many complex situations which have arisen with industrial and road traffic developments have met with little or no success. Public health officials must therefore, of necessity, be concerned at the present situation in road and factory morbidity and mortality, since it is particularly in these cases that the solution is at all clear. A continuation of the plan of safety health education of pedestrians, drivers, machine operators; rational traffic regulations

intelligently enforced, as well as general safety supervision and care are, of course, desirable but attempts at control will prove abortive if they do not go further. The practical utility of selection tests and physical examination of drivers as applied to a solution of the general problem of road accidents are phases of control which have already been shown to be of specific value, and in this field we will await the results of further inquiry with considerable interest.

At the present time much energy is being expended in blind efforts to prevent accidents, while in truth we are grossly ignorant of their fundamental causes. Concerning road accidents in particular, there is an immediate need for controlled scientific investigation into the casual factors involved. Such research would pay dividends in human lives—lives of perfectly healthy citizens.

#### THE FIRST PRODUCTION OF DIPHTHERIA ANTITOXIN IN THE UNITED STATES

THE brief outline of the first production of diphtheria antitoxin on this continent which Dr. Wm. H. Park has kindly contributed in this issue is of distinct historical interest. It is interesting in this connection to recall the first clinical trial of diphtheria antitoxin by Dr. Emil Roux of the Pasteur Institute, Paris, which was presented in a communication before the International Congress of Hygiene at Budapest in 1894. At this meeting Dr. Roux outlined the results of the treatment in the diphtheria pavilion of the Sick Children's Hospital, Paris, where he had commenced the use of the serum both for prevention and treatment on February 1st of that year. During the preceding five years the average mortality, expressed per hundred cases, had been 51.7. From February 1st to July 24th, the period during which serum was used in treatment, the mortality fell to 24.5. In the Trousseau Hospital, Paris, where serum was not used, the mortality was 60 during the same period. As a routine, all patients received on admittance a hypodermic injection of 20 cc. of serum and cultures were then made to confirm the diagnosis of diphtheria. During the period 128 children admitted to the wards with throat infections were shown not to be suffering from diphtheria. None of these children contracted the disease, giving evidence of the preventive value of the serum.

As Dr. Park has outlined, the preparation of diphtheria antitoxin was soon undertaken in New York City and within a few months distribution was commenced by the Bureau of Laboratories. Dr. Park's objective was the providing of diphtheria antitoxin for every case without charge. The accomplishment of this led later to the preparation and distribution of other essential public health biological products and the conduct of researches which have made the Laboratories which he founded and directed internationally known. Many honours have come to Dr. Park. The recent presentation of the Roosevelt Medal for distinguished public service not only was a further expression of the appreciation of his achievements in the field of science but constituted a popular recognition of his years of service to the cause of public health.



# CURRENT PUBLIC HEALTH COMMENT

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Toronto

## HEALTH INSURANCE IN BRITISH COLUMBIA

**E**VEN in times of prosperity the financial burden of illness is a distinct hardship to a great proportion of the wage-earning population of this and other countries. It is obvious, therefore, in times of financial stringency when so many of that class are no longer employed, that enlightened legislators should plan to correct the outstanding social problems of the past. This particular problem has been met in industries and occupations that present physical and chemical hazards by legislation and benefits arising therefrom, in the nature of Workmen's Compensation Acts which to a great extent owe their introduction to organized labour. These have provided relief in the event of accidents associated with industry, but make no provision for illness of other origin. That unorganized group of wage-earners who, for various reasons, are not so protected have been afforded protection only in so far as they have been able individually to contribute to the several mutual benefit and voluntary insurance organizations and that only as long as they are able to pay their way. The various professions who are called upon to afford medical assistance to these (real or potential) wage-earners and their families whether they receive remuneration commensurate with their services or not, are naturally interested in any legislative proposals that are designed to ease the financial burden of illness to the sick and their dependants with whom must be linked the medical attendants.

The benefits originally proposed for residents of the Province of British Columbia affect two general groups whose qualifications may best be shown as follows:

- I. *Contributory eligible persons*
  1. Income not in excess of \$2,400.00 per annum.
    - a. Employees in receipt of wages and their dependants.
    - b. Voluntary contributors and their dependants, subject to a physical examination.
  2. Without income restrictions.
    - c. Residents of a rural community and their dependants, subject to a financial agreement between the "rural municipalities" (which are defined) and the Commission.
- II. *Non-contributory eligible persons*
  - a. Indigent persons and their dependants, the former being defined by the Commission.

The recommendations of the Hearings Committee in respect to this section reduces the maximum income limit of eligible contributory persons to \$1,800.00 in place of \$2,400.00 per annum. Although the draft Bill does not specify the financial limits of the rural insured persons, from the later report it would appear that it is intended that these should be limited to agricultural labourers. Precautions are provided to prevent any duplication of benefits by the maintenance of a register and certification of all qualified persons and the restriction of benefits to those not having the advantage of other forms of insurance.

### *Benefits*

The benefits under this scheme are designed to afford insured persons the advantage of a comprehensive medical service as well as cash benefits, the latter to compensate the wage-earner with dependants not otherwise covered for the loss of his income while disabled. In the case of the medical benefits, two months after becoming a contributor the insured person and his dependants are to be entitled to the services of the general practitioner, the specialist, drugs, other prescribed appropriate supplies and laboratory services, a limited home-nursing service, and dental services of a preventive

nature. Free hospital treatment (excluding treatment for tuberculosis and mental disease) is also provided for three of any fifty-two weeks with the possibility of extension to a limit of ten weeks, after which a proportion of the costs must be borne by some other source than the Commission. Finally, a complete maternity service, which by implication may include the foregoing benefits, and provides also for prenatal and postnatal care.

Cash benefits are to be restricted to insured persons who have dependants and are not in receipt of hospital benefits, or otherwise covered by other unemployment or compensation arrangements. Restrictions are necessarily included setting down the period of time that an employee is contributory before becoming eligible and limiting the number of days for which he may enjoy these benefits. There is a waiting period after disability of seven days, the onus of notification being the insured person's responsibility, after which payments may be made of not more than \$10.00 per week, the last being based upon a six-day week.

The more recently published report of the Health Insurance Hearings Committee recommends the exclusion of cash benefits for the present and a restriction of the medical benefits noted above, to include only essential medical services such as the services of physicians, three weeks' hospital care, essential x-ray and laboratory aids, periodic health examination, with payment by the Commission of only 25 per cent of the drug costs. This eliminates for the present the proposed maternity benefits, and the services of the specialists, dentist and visiting nurse. It is thought that the eligibility of the insured person to these benefits should commence a month after contribution to the fund begins rather than after two months as originally proposed. It is further specifically recommended that the services of

osteopaths and chiropractors be not included as benefits.

The income from which the Insurance Fund is to be financed will be obtained by (a) an annual contribution from the Provincial Treasury which covers the benefits to indigent insured persons, (b) a contribution by the insured person and by the rural municipalities for the benefit of the rural insured persons, (c) the employer, all such contributions being exempted from the Provincial income tax. The fund thus established is calculated to cover all the benefits and the costs of administration. Although the annual governmental allocation was originally restricted to a maximum of \$1,200,000, the committee recommends that this should not be specified. The employer's share is to be two-thirds of the insured employee's, but is not to be in excess of 2 per cent of the payroll, whereas the one-third contribution of the employee which is deductible by the employer from the wages, is not to be in excess of 3 per cent of all the wages receivable. The plan of assessment recommended by the Hearings Committee involves a division of the contributory employees into two groups, (a) those whose wages total less than \$1,000.00 a year (or if financially possible, \$800.00 per annum) and (b) those receiving more than that up to the maximum limit of \$1,800.00. For the former it is proposed that assessment be made upon employees and employers on a flat-rate basis, whereas for the latter the assessment be for the employees at the rate of 2 per cent of the individual's wage and for the employers at a rate of 1 per cent of the individual employer's payroll for this particular group. The voluntary contributor must bear his full share of costs of benefits and administration and the rural municipalities will be responsible for the contribution to the fund of an agreed amount which will naturally vary with the number of eligible insured persons in the respective municipalities.

### Professional Services

The medical benefits, *per se*, include those services contributed as defined by the medical, dental, nursing and pharmaceutical professions as well as the hospitals (other than the institutions concerned in the treatment of tuberculosis and mental disease). All duly licensed physicians and pharmacists have the right to provide the services involved in the medical benefits, with a restriction provided for sparsely settled areas where special arrangements may become necessary. Similar rights obtain where feasible in so far as dental practitioners and private duty nurses are concerned. The standards of service furnished are to be the collective responsibility of the professional bodies concerned and failure to meet these will render the individual subject to penalization. The principle of free choice of physician, as well as freedom to change on the part of the insured person, is provided in the original draft, but in the case of the indigent insured persons conflicts with the "closed hospital" system and is recommended in this respect for modification by the Hearings Committee.

The proposed allocation of funds for medical benefits in the original draft bill is fixed within a maximum and minimum limit on the basis of the individual insured person, the total sum being not less than \$10.50 and not more than \$13.20 per annum. This is roughly divided as follows:

1. General practitioner service, 28 per cent.
2. Hospital service, 28 per cent.
3. Drugs, surgical supplies, etc., 11 per cent.
4. Specialist service, 8 per cent.
5. Laboratory service, 8 per cent.
6. Nursing service, 5 per cent.
7. Dental service, 5 per cent.
8. Unspecified services, 5 per cent.
9. Maternity service (general practitioner), 2 per cent.

The proportional distribution of items 1, 2, 3, and 4 may be somewhat increased within a maximum limit at the expense of the other items which are fixed. This apportionment is proposed only for the first two years after the

Act becomes effective, but if the recommendations of the Committee are accepted, as noted elsewhere, in eliminating items 4, 6, 7, 9, and modifying items 1, 2, 3, 5, these proportions will necessarily be altered.

The original proposals with regard to the remuneration for services to indigent insured persons were scaled at one-half the standard rates. The Committee, however, recommends that the provincial government should assume the entire responsibility for this class of insured persons.

### Administration

The proposals of the Draft Bill provide for an executive body to be known as the Health Insurance Committee, assisted by two councils who are to act in an advisory capacity, and form a liaison between all the various contributory parties to the scheme. Provision is made for the setting up of an Appeal Board empowered to deal summarily with all grievances arising in respect of those concerned by the Act. Some apprehension appears to have arisen amongst the members of the Hearings Committee because of the size of the various bodies, and the retention of authority in the hands of full-time civil servants, in consequence of which rather sweeping alterations are recommended which are, briefly, as follows:

(a) The Health Insurance Commission—to be composed preferably of three members (not exceeding five), to include a representative of the employees and a representative of the employers.

(b) The Advisory Council—(not to exceed six members, one of whom shall be a woman) supplying technical advice such as might be provided by the Provincial Health Officer, the Chairman of the Workmen's Compensation Board, the Deputy Minister of Labour, the Director of Social Welfare, a representative of the College of Physicians and Surgeons of British Columbia, and the Director of Medical Services.

(c) The Appeal Board—no provision to be made for this body, presumably leaving the settlement of disputes that might arise to the existing legal processes.

(d) Other Committees or Councils—no provisions to be made for these in the Act

but to be left to the discretionary appointment of the Commission.

Comment is probably inappropriate at this juncture, but it is noteworthy that unanimous agreement was not forthcoming in respect to some of the recommendations of the Hearings Committee, the representative of hospital and farmers' interests dissenting from the assessment proposals, and the representative of the Canadian Medical Association recording disagreement with the proposed elimination of a Medical Committee from the administrative organization.

This plan of health insurance proposed for the Province of British Columbia supplies another approach to the problem which is interesting many sections of the Dominion, not least of which must be the medical profession, which it appears is designed to provide most of the service. Whether one agrees with the principles underlying legislation of this kind or not, the wage-earner is most conscious of his present inability to finance the illness of his dependants or of himself, and the situation must be faced.

#### HOUSING IN SOUTH AFRICA

**A**LTHOUGH the responsibility for the control of the insanitary conditions associated with overcrowding of living premises and areas known as slums may be within the scope of public health authorities, the reason for the state of unsatisfactory housing is basically of social and economic origin. The housing problem therefore can be solved only when legislators recognize it as their responsibility that these evils be corrected and at the same time that provision be made to prevent as far as possible a recurrence of conditions, the correction of which now must necessarily be a costly drain on the overburdened public purse. With Great Britain's lengthy experience of the housing problem, commencing in 1851, it is surely unnecessary for the Dominions to avoid profiting from these efforts directed towards

the social betterment of the labouring classes. That experience has shown that there are at least two stages in attempting to solve the problem: (1) provision for the construction of new houses, to reduce the incidence of overcrowding, and (2) provision for the demolition and reconstruction of slum areas.

Since in many instances working class rentals must be on a sub-economic basis, there is little inducement for private enterprise to undertake the construction and management of houses for this class. In consequence financial assistance by various means must be supplied by the State to provide new housing, as well as to permit the demolition and reclamation of congested areas.

In the Union of South Africa the Housing Act of 1920 enabled the local authorities and public utility societies to construct new houses, with the financial assistance of the Government. During recent years money for this purpose has been made available for sub-economic construction of houses at lower interest rates than previously. Up to the end of June, 1933, of the 13,278 houses built or under construction by this means, approximately 34 per cent are for European occupation and about 7 per cent of the total are constructed for sub-economic letting. It was not until the enactment of the Slum Act of 1934 that statutory provision was made for slum clearance.

A summary of the most striking features of this Act is included herewith to show the legislative assistance that is thought necessary to implement the Housing Act, and to eliminate the slum problem in the Union.

#### *Slum Act, 1934*

1. Although only operative in eight of the large towns of the Union, provisions are made to permit its extension.
2. Where the municipal medical officer of health finds a premises in an insanitary, dangerous or overcrowded

condition that can be most effectively dealt with through this Act, the local authority, after hearing the owner's representations, may declare the premises a slum. Subject to the confirmation of the Minister of Public Health, the owner may be directed to remedy the conditions noted, or if these are not remediable may either be directed to demolish the premises or the local authority may acquire the property by expropriation.

3. Having declared a property as a slum, it is so endorsed on the title deed, but this may be cancelled upon the satisfactory correction of the condition involved. Until the insanitary conditions are remedied, under specified conditions, no rent is payable and the property may neither be sold nor

leased. Should the owner fail to effect the necessary improvements or the order for demolition, this may be done by the local authority. An appeal may be made to the Minister relative to the declaration or the refusal to rescind.

4. It is made possible for a local authority to deal with an insanitary area as for single premises, notwithstanding the existence within that area of some premises that are not insanitary. Furthermore, subject to ministerial confirmation it is possible to round off a slum clearance area by the expropriation of necessary neighbouring land.

5. The local authority is given power to make regulations for the prevention of overcrowding and insanitary conditions and also for licensing and controlling sub-lettings.

REPORTED CASES OF CERTAIN COMMUNICABLE DISEASES IN CANADA\*  
BY PROVINCES—JANUARY, 1936

Diseases	P.E.I.	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Diphtheria.....	—	24	15	100	36	30	23	12	2
Scarlet Fever....	3	66	26	588	1461	227	114	228	197
Measles.....	24	175	26	1112	5367	1200	524	121	547
Whooping Cough.....	—	155	45	239	1226	86	165	39	145
German Measles..	—	12	—	1093	2115	58	1835	49	674
Mumps.....	—	24	2	274	2188	301	1187	34	824
Smallpox.....	—	—	—	—	—	—	—	1	2
Cerebrospinal Meningitis.....	—	—	—	6	4	1	1	—	1
Anterior Poliomyelitis...	—	—	—	—	1	—	—	3	—
Typhoid Fever...	—	—	4	68	14	4	1	4	—
Trachoma.....	—	—	—	—	1	1	5	—	7

\*Data furnished by the Dominion Bureau of Statistics, Ottawa.

## ASSOCIATION NEWS

### THE TWENTY-FIFTH ANNUAL MEETING

**E**XCELLENT progress is being made in the plans for the twenty-fifth annual meeting of the Association, to be held in Vancouver during the week of June 22nd in conjunction with the Western Branch of the American Public Health Association and the Canadian Tuberculosis Association. The arrangements provide for a week of meetings of exceptional interest.

On Monday and Tuesday the Canadian Tuberculosis Association has arranged sessions and clinical visits. On Wednesday the three associations will hold joint meetings, the major topic being tuberculosis. The opening general session will be held on Wednesday morning when, following addresses of welcome extended by the Province of British Columbia and the City of Vancouver, the presidential addresses will be delivered by Dr. W. F. Cogswell, President of the Western Branch of the American Public Health Association, Dr. H. E. Young, President of the State and Provincial Health Authorities of North America, and Dr. J. W. McIntosh, President of the Canadian Public Health Association. The program of tuberculosis control in Vancouver will be discussed and the opportunity given to visit the Vancouver Public Health Institute for Diseases of the Chest. The luncheon program will be featured by three short addresses from leaders of the associations. The afternoon will provide the opportunity of seeing Vancouver's water supply and a trip to Seymour Creek Intake on the invitation of Mr. E. A. Cleveland, Chairman of the Greater Vancouver Water District. A public meeting is planned for Wednesday evening under the chairmanship of Dr. Reginald M. Atwater, Executive Secretary of the American Public Health Association.

The speakers will include the Hon. D. Patullo, Premier of British Columbia, and the Hon. Dr. G. M. Weir, Provincial Secretary and Minister of Health for British Columbia.

On Thursday and Friday mornings the various Sections of the Canadian Public Health Association will have the opportunity of holding their meetings. Several joint meetings will be arranged for the discussion of subjects of special interest. On Thursday afternoon, following the general session, a motor trip is planned to Grouse Mountain Chalet and on Friday afternoon a trip around Vancouver Harbour is being arranged by the Harbour Board. A final session will be held on Friday afternoon, at the conclusion of which the members will leave for Victoria, B.C., where the Association will be welcomed on Saturday morning at the Parliament Buildings by the Lieutenant-Governor. A visit will be made to the famous Butchard Gardens and provision will be made also for those who desire to visit the Quarantine Station at William Head.

Not only does the meeting promise to be outstanding because of the many important papers which are being contributed, but it offers the opportunity for a visit to Vancouver and Victoria under the most favourable auspices. This is Vancouver's Jubilee Year. The summer tourist rates will be effective and routings may be arranged to include either a visit to Prince Rupert and Jasper Park or to Seattle. Members are urged to make early hotel reservation. The convention headquarters will be Hotel Vancouver.

### COMMITTEE ON THE CERTIFICATION OF SANITARY INSPECTORS

**A** MEETING of the Central Board of Registration and Examination of the National Committee on the Certification of Sanitary Inspectors was held in Toronto on February 15th



under the chairmanship of Dr. J. G. Cunningham. The meeting was attended by Dr. R. St. J. Macdonald, Montreal, Dr. J. A. Baudouin, Montreal, Mr. Percy Pickering, Winnipeg, Mr. A. S. O'Hara, Sioux Lookout, Ont., Dr. J. T. Phair, Toronto, Dr. R. D. Defries, Toronto, and Dr. M. H. Brown, Toronto, in the absence of Dr. D. T. Fraser.

Matters relating to registration were carefully considered and the present regulations confirmed. Regarding the provision for the granting of the certificate to those already holding a qualification in sanitary inspection acceptable to the committee, the Central Board recommended for the consideration of the National Committee that the fee for such registration be \$5.00 and that this arrangement be continued until January, 1938. The Board reviewed the conduct of the examinations and confirmed the granting of certificates to those who sat for the examinations and those who had made application as holders of a satisfactory qualification. The date of the next examinations was set for September 23rd, 24th and 25th, with the closing date for the reception of applications as August 24th. Encouraging reports were received concerning the interest in the Canadian certificate and the provision of training as offered in various centres through local departments of health or by members of such departments. Reports were received also that several departments of health had established that only qualified inspectors would be eligible for new appointments. The Board recommended that the National Committee should make every effort to acquaint medical officers of health throughout Canada of the desirability of similar action. The responsibilities and duties of the Central Board as well as of the Committee were carefully reviewed. A sub-committee consisting of Dr. R. D. Defries and Mr. A. S. O'Hara was appointed to consider the preparation of a manual of instruction for the use of those preparing for the examinations.

#### THE GROWING MEMBERSHIP

THE Association has cause for much satisfaction in the strength of its membership. Through the co-operation of the various provincial departments of health the Association has the privilege of having practically every medical officer of health as a member. The active membership, including the members of the nine sections, is approximately 2,800. Each of the sections is completing its own roll of membership, the privilege being given to each member of the Association to join in the work of one or more sections. When the new section of Public Health Education was organized at the last annual meeting more than fifty members joined the Association and through their interest the section was made possible and is preparing a program which will enlist the support of a number of members of the Association. On the invitation of the Association, extended through the Canadian Life Insurance Officers' Association, a group of eighty-five of the senior executives of the leading life insurance companies, including the medical referees, actuaries and statisticians, have become associated as members. This added strength will be greatly appreciated, particularly by the Section of Vital Statistics and Epidemiology, and will serve as an encouragement to the efforts of the various committees which are concerned with the improvement of vital statistics.

#### HOUSING

A NUCLEUS committee of the National Committee on Housing, which is being established by the Association, held a meeting in Toronto on February 14th, under the chairmanship of Dr. R. St. J. Macdonald, Montreal, and made plans for the preparation of a report to be presented at the annual meeting in Vancouver. It was pointed out that medical officers of health find a great difficulty in performing their duties under the various provincial public health acts

and regulations as relating to housing. Reports were received from several centres indicating that steps had recently been taken to meet local situations. It was decided to attempt the drafting of minimum standards of housing as related to health which would at least be province-wide if not national in scope. The organization of the committee is being arranged by the secretary, Dr. L. A. Pequegnat, Toronto, and a preliminary report will be available for discussion in June.

#### CONFERENCE, SECTION OF VITAL STATISTICS AND EPIDEMIOLOGY

**F**OR the first time since its organization in 1928 the Section of Vital Statistics and Epidemiology is calling a special conference of its membership. The conference will be held in Toronto in the latter part of April or early in May for the purpose of receiving the report of the Committee on the Certification of Causes of Death as it relates to the revision of the International List of Causes of Death. The conference will also discuss the use of the new death certificate and its findings will be incorporated in the report of the committee, which will be presented at the Vancouver meeting.

The membership of the Section includes not only those who are engaged in the registration of vital statistics in the Dominion, provincial and civic departments of health but also a number who are engaged in university teaching and the medical officers and statisticians of the various life insurance companies. Further announcement of the meeting will be published in the April issue.

#### THE ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION

**A** CORDIAL invitation is being extended to all public health workers in Canada to attend the sixty-fifth annual meeting of the American Public Health Association in New Orleans

next October. Canadians have always had a very definite part in this continental health association. This year Dr. R. E. Wodehouse, D.P.H., Deputy Minister of Pensions and National Health, Ottawa, was elected First Vice-President. Certain activities of the American Public Health Association are well known to health officers throughout Canada. Among these may be mentioned the publication of the American Journal of Public Health, the work of the Committee on Administrative Practice, and the contributions of the Laboratory Section, particularly the publication of Standard Methods. These are, however, but a few of the important contributions which are being made. Those who have had the privilege of attending the annual meetings of the American Public Health Association know how well the international aspect of the Association is maintained. It is hoped that the membership from Canada may be considerably increased during this year.

#### RECOMMENDED LABORATORY PROCEDURES

**D**URING the past four years the Laboratory Section has held a Christmas meeting in the Royal York Hotel, Toronto. The attendance of more than one hundred members indicates the importance which this meeting now has in the laboratory field. One of the important functions of the Section is to recommend for trial certain new laboratory procedures. Each year the Section considers such procedures as may be recommended and last December five methods of public health interest were described in detail and published by the Section as Bulletin No. 1. Every member of the Section has been supplied with a copy, together with an abstract of the papers presented at the Christmas meeting. Additional copies of the Bulletin may be obtained from the office of the Association at a cost of twenty-five cents.

## BOOKS AND REPORTS

### **An Introduction to Public Health.**

By Harry S. Mustard, M.D., Associate Professor of Public Health Administration, The Johns Hopkins University, Baltimore, Md. Published by the Macmillans in Canada at St. Martin's House, 70 Bond St., Toronto, 1935. 250 pages. Price \$2.50.

For some time there has been an urgent need for a book which would didactically present the background and development of public health and touch broadly upon the essentials of the various fields of study and endeavour coming within its broadening scope. Doctor Mustard's book fills this requirement admirably and will prove of real service to students as an introduction to public health.

The subject matter includes vital statistics, organization and administration of public health work, acute communicable diseases, immunity, venereal diseases, sanitation, personal hygiene, maternal and infant hygiene, school health service, and public health aspects of certain non-communicable diseases. In each instance the subject is presented as introductory reading and only the essential details are included. It has been possible, therefore, to include within only 250 pages a real wealth of information in a most convenient form. At the end of each chapter references and other suggested reading are indicated.

This book is an immediately useful, practical text for any group of students, medical or otherwise. The didactic mode of presentation and the subject matter included render it admirably suited to the purpose conceived by Dr. Mustard—"to orient the student in the field of public health".

A. H. Sellers

### **Child Nutrition on a Low-priced Diet.**

By Mary Swartz Rose and Gertrude M. Borgeson. *Child Development Monographs*, No. 17.

Bureau of Publications, Teachers College, Columbia University, New York, 1935. 109 pages. Price \$1.50.

This is one of a series of monographs dealing with widely divergent aspects of children's problems in nutrition. The present one discusses the results of a thoroughly conducted, long-term study of the effects of a carefully-constructed diet, with and without certain supplements, upon a group of sixty children. The subjects attended a nursery school in New York City and were under daily supervision. Home conditions were also adequately checked. The authors are to be congratulated upon the manner in which the investigation was carried out, and if the monograph serves no other purpose, it will provide a pattern to be followed in nutritional surveys.

The principal basic reason which impelled the authors and which is set forth in the introduction is worth considerable emphasis. The authors state that many, if not most, investigations in nutrition are carried out on laboratory animals. This permits carefully controlled conditions and the results have great usefulness. It is not possible to translate these results, however, from laboratory animals to human beings. The crucial test of any food or diet intended for humans is the effect upon that species. This is often forgotten and glib statements are frequently made about human nutrition without real knowledge. The authors have made this monograph serve a second useful purpose by pointing out this important fact.

Half of the children in the group were given an egg per day; the balance did not receive eggs. From the results of animal experiments the children consuming eggs should have shown results not to be seen among the controls. Actually there was no great difference in growth, in haemoglobin formation, in dental health, in resistance to infec-

tion, or in general health. It is possible that this lack of difference may have been due to the completeness of the basal diet. It is interesting that the daily consumption of eggs by young children produced no adverse effects, such as constipation.

The main result of the investigation is that children may be adequately nourished upon a low cost diet. This should be highly reassuring to public health officials at the present time. Those who are concerned in relief nutritional problems should read this monograph.

E. W. McHenry

**The Source of Infection in Puerperal Fever due to Haemolytic Streptococci.** By Dr. Dora Colebrook. Issued by the Medical Research Council. *Special Report Series, No. 205.* Published by His Majesty's Stationery Office, London, England, 1935. Canadian representative, Wm. Dawson Subscription Service, Ltd., 70 King St. East, Toronto. 100 pages. Price 1s. 6d. net.

The investigation reported is a part of the research on puerperal fever in progress under the direction of the Medical Research Council at Queen Charlotte's Hospital since 1930. It is of great interest not only in its direct application to the prevention of puerperal fever, but in its wider application to the transmission of haemolytic streptococcus infections in general. Essentially, it is an attempt to determine the source of infection in cases of puerperal fever due to haemolytic streptococci by careful serological comparison of the infecting strains with strains found in the nose and throats of the patients themselves and their attendants.

The material was obtained from cases and contacts of cases of puerperal fever admitted to the Isolation Block of Queen Charlotte's Hospital and from some cases occurring throughout the country. In spite of the difficulty of obtaining swabs from all

contacts, the material from half the cases could be considered effectively complete as regards patients and attendant contacts, but swabs from members of the household were obtained only in 6 of the 31 otherwise complete groups. The direct slide agglutination technique of Griffith, macroscopic agglutinin absorption, and direct macroscopic agglutination tests were used. The technique and results are described in detail, and 25 pages of tables and charts are appended. There was close agreement throughout between the results with the slide method and macroscopic absorption test.

In the 67 cases investigated a possible extragenital source was found in 48 (76 per cent). Owing to deficiencies in swabbing, this figure probably is, in the words of the author, "fallaciously low". It was definitely higher (87 per cent) for the group in which there were swabs from all the attendants than for the group in which some swabs were missing (65 per cent).

From the combined serological and epidemiological evidence in the 48 cases in which a possible source was found, the author concludes that in only 6 the source of infection was the patient's own extragenital strain, in 24 an attendant contact, and in 9 a household contact. In 9 it was undecided whether the patient or the contact was the source of infection. In two instances lesions outside the respiratory tract were the only source of infection found. Of 13 contacts known to have had a recent infection of the nose or throat 12 harboured strains identical with the infecting strain of the patient. Thus, even with incomplete material, it is clear that the most important source of infection is the respiratory tract of the contacts, and that contacts other than the attendants should not be overlooked. Infection may also occur from non-respiratory infections in patient or contact, and occasionally the patient's own nose or throat may be the source of infection.

Frieda H. Fraser

